EVALUATION AND COMPARISON OF TELECONFERENCE TRAINING WITH FACE-TO-FACE TRAINING AND THE EFFECTS ON ATTITUDE AND LEARNING

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by

Delores J. Davis

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EVALUATION AND COMPARISON OF TELECONFERENCE TRAINING WITH FACE-TO-FACE TRAINING AND THE EFFECTS ON ATTITUDE AND LEARNING

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The problem. The purpose of this study was to determine if there was a difference in attitude and achievement of adult learners who participated in training via teleconferencing, face-to-face training, or a combination of both. Examined also was the relationship between attitude of participants and achievement scores. Varying somewhat from other research studies was the finding of a significant difference between the groups in attitude toward the training method. The results of the study confirmed previous research findings of no significant differences in achievement scores existing between the groups.

Procedure. The study was conducted on a random sample basis. Eighty-seven cases were included in the analysis and randomly assigned to the four treatment groups. The course content, pre- and post-tests, and the attitude assessment instrument were developed based upon extensive research in the area of teleconference and evaluation. Four methods of delivery were used: all face-to-face, all teleconference, face-to-face prior to teleconference, and teleconference followed by face-to-face. Each treatment group utilized the same instruction, content, instructor, and instrumentation. Only the method of delivery was varied.

Conclusions. Differing significantly from the other groups, the all face-to-face group was much more positive toward the method of delivery than were the other three groups. As face-to-face contact increased, the attitude responses of the participants improved. Although there was no significant difference in achievement scores between the groups, the all teleconference group obtained the highest gain score. There was no significant relationship between attitude and learning.

Recommendations. The study concludes with suggestions for successful uses of teleconferencing. Educators employing teleconferencing must develop curricula which can create an environment that can replace the need for face-to-face contact. Recommendations for successful uses for teleconference instruction include humanizing the learning environment, allowing for maximum participation by students, implementation of a presentation style which is conducive to learning, and feedback between student and instructor to insure learning.

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CHAPTER ONE

Introduction

Executives and administrators who manage organizations and educational institutions are becoming increasingly aware of the need to reduce operating costs while continuing the educational development of the employees and students they serve. Technological changes within the communications field are occurring at a rapid pace thus offering administrators and faculty an opportunity to take advantage of a wide array of media to assist in making available a broader range of educational opportunities. Recent technological advances have created the opportunity for students and employees to be "distance learners," a term used to identify students at distant locations who are able to participate in an educational experience without the necessity of traveling to a central site. It is the use of one technologically advanced medium--interactive audio teleconferencing--that is being examined in this study.

"Teleconferencing is the bringing together of two or more groups of people in different locations for the purpose

of communicating electronically."[1] Educational and business organizations are establishing teleconference capability--either audio, video, or computer--as a means of replacing physical travel while continuing to provide training and educational opportunities for the students and employees they serve.

With the increased cost of travel, hotel and motel accommodations, and gasoline, more organizations are taking advantage of teleconferencing.

> The use of the telephone to deliver educational materials to a distant audience has obvious appeal to those unable for economic or physical reasons to travel to the site where the audience has gathered.[2]

Currently, teleconferencing is being utilized as a method for not only training and education but also convening meetings, for professional development, and information giving and receiving.

> A benefit of teleconferencing is that it often reaches the middle-management people who really need the information but have neither the time nor the money to attend a distant, live seminar.[3]

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[1]Rex Spiller, "Full-Motion Video Teleconferencing: How and When to Use a New Technology," T.H.E. Journal, April 1984, p. 86.

[2]G. J. Vesprani and W. C. Veatch, "Teleconference and Videotape as Teaching Tools for Multi-University Instruction," Journal of Biocommunication, 7 (1980), 10.

[3]Paul E. Gillette, "Associations Try Teleconferencing," Association Management, 35 (1983), 95.

There are differing viewpoints regarding the advantages and disadvantages of audio telecommunications as a viable tool for communicating.

> Frequently, in the world of training and education, new theories or innovations meet with polarized responses: some view them as a panacea for the failings of education, while others, more skeptical, are convinced that nothing can improve the traditional educational process.[1]

Critics of the method state that what the organization gains in saving travel and time costs, it sacrifices in the absence of face-to-face contact. Buckley Mintcloud, writing in the journal Supervision cites Steve Morrow, vice president of a midwest manufacturing company:

> A teleconference under many conditions can accomplish everything a live in-person meeting can achieve in much less time and for a whole lot less money. What you sacrifice, of course, is the personal face-to-face contact.[2]

On the other hand, other writers contend that given the appropriate advanced preparation, adaptation of materials suitable to the medium, participants committed to the same goals, and innovative meeting or training content and leadership, the use of telecommunications can be viewed favorably by all involved with its use.

> The research on teaching via the telephone is rather extensive, and seems to support the view that, with proper design of program

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[1]Spiller, p. 86.

[2]Buckley Mintcloud, "Money-Saving Ideas for the Profit-Minded Supervisor," Supervision, 43 (1981), 22.

> materials, the telephone is an effective, inexpensive educational communication channel.[1]

The appropriateness of the topic to be presented and the manner in which the material is prepared is critical to a successful teleconference experience.

> The selection of the teaching method most likely to be effective for the content is one of the primary decisions that must be made by the instructor. It is just as possible to use creative and innovative teaching methods with telephone as with face-to-face instruction. As a matter of fact, one may be less likely to fall back on old habits since teaching by telephone already requires something of a change in the approach.[2]

In an effort to meet continuing communication, training and education needs, the Iowa Department of Human Services installed a telecommunications system in 1979 capable of linking sixteen district offices, sixteen institutions and nearly all ninety-nine counties as well as the Area Education Agency sites statewide with the central office located in Des Moines, Iowa. The system is called the Central Information Delivery System (CIDS). With the combination of the installation of the CIDS system and the continuous federal and state budget cutbacks, administrators began to increase their use of the network for meetings and

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[1]Loren A. Parker and Betsy Riccomini, The Status of the Telephone in Education (Madison, WI: University of Wisconsin, 1976), p. 5.

[2]Ricki Ann Bronstein, Jack E. Gill and Elmer W. Koneman, Teleconferencing: A Practical Guide to Teaching by Telephone (Chicago: American Society of Clinical Pathologists Press, 1982), p. 66.

training as a means to continue communication with employees and constituent groups at minimum cost.

However, with the advent of provision of training via audio teleconferencing, participant reactions to the medium began to surface as negative. The evaluation forms which were completed following all training sessions indicated a dissatisfaction with the use of the teleconference system as a means for training. Voiced most frequently was the dissatisfaction with the inability to see the instructor and the other participants located in statewide sites.

Because this dissatisfaction seemed so prevalent in the teleconference training sessions, learning using this training medium became questionable. Were participants who disliked attending training via teleconferencing able to learn the content presented? Did participant attitude toward teleconferencing cause a difference in the amount of learning taking place? Could participants who attended teleconference training learn as well as those who participated in the same training if it were offered as face-to-face?

John Naisbitt writes in his bestseller Megatrends, "What happens is that whenever new technology is introduced into society, there must be a counterbalancing human response--that is, high touch--or the technology is rejected. The more high tech, the more high touch."[1] If this is

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[1]John Naisbitt, Megatrends (New York: Warner Books, 1982), p. 35.

true, then the presence of educational opportunities using teleconferencing may be less effective because of the lack of face-to-face interaction required by human beings.

If human beings need the personal interaction and understand that teleconference training precludes the visual image of other participants and the instructor, will their attitude toward the method of instruction be affected? If attitudes are affected, what will happen to the learning process? Is there a relationship between attitude and learning?

Robert Gagne writes in Conditions of Learning,

> Many studies have been performed which illustrate the same basic trend: an absence of any high degree of relationship between attitudes as reported by responses to questions and actual behavior. There are several possible reasons for this finding. The first is that attitudes, as customarily measured, are simply not the same as behavior; and such a relationship should not be expected. . . . Another way to say this is to state that social behavior is largely situationally determined, and attitudes play only a limited role in regulating behavioral outcomes.[1]

The question remains, then, does teleconferencing effect attitude and learning of participants?

In view of the positive and negative reactions to the use of audio teleconferencing as an educational and communication tool, the answers to these questions revolve around the effectiveness of the medium without the advantages of

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[1]Robert Gagne, Conditions of Learning (New York: Holt, Rinehart and Winston, 1977), p. 236.

face-to-face interaction of participants. Finally, if an organization were able to combine teleconferencing and face-to-face training, would the effect on attitude and learning be significant? The succeeding chapter underscores the importance of these questions through the examination of the literature concerning the effectiveness and limitations of audio and video-assisted instruction.

Statement of the Problem

Based upon a review of the literature involving learning and attitude theory, adult education, and the research of practitioners involved in electronic-assisted instruction, the focus for this study was identified. Finding a consistent indication that learning takes place when students are exposed to both audio and video-assisted instruction, further examination was warranted to ascertain if attitude of students toward the medium affected learning, and further, if a combination of both face-to-face and teleconferencing would increase achievement. This study provides a more rigorous test of the previous studies cited in the literature.

Presented in this study is a two-faceted problem: first, what is the effect of the method of delivery of instruction on achievement and attitude and second, what is the relationship between attitude and achievement. Examined in this study are the differences in attitude and achievement

scores of participants who attend training in four distinct methods: face-to-face only, interactive audio teleconferencing only, face-to-face preceding teleconference training, and face-to-face following teleconference training. Following the instruction, the data was analyzed to determine whether there was a relationship between attitude toward the method of instruction and achievement.

Statement of the Hypotheses

The findings by noted theorists in learning and attitude lend support for the hypotheses that achievement can occur given the correct set of circumstances. It is, then, the goal of the instructional designer to create the best possible learning environment. Adult educators and practitioners in the field of electronic-assisted instruction have provided research which supports the contention that learning can occur using audio or video-assisted instruction.

It is the creation of an environment which is conducive to learning which is critical to instructional designers who consider the method of delivery to be other than the traditional face-to-face classroom. The review of literature cited addresses the effect of student attitude toward the method of instruction and its corresponding relationship to learning. Research findings indicate support for the hypotheses that learning can take place using a variety of electronic-assisted instruction methods. Based

upon this literature review, the following hypotheses are stated:

1. There is no difference in participant attitude among the four training methods.
2. There is no difference in participant achievement scores among the four training methods.
3. There is no relationship between attitude and achievement.

Significance of the Study

The results of this study will have significance for educators and trainers in organizations who are charged with the responsibility to provide instruction to students and employees at several geographical locations. This study highlights factors to be addressed when educators and trainers consider the use of teleconferencing as a means of providing education to the distance learner. Specifically, this study addresses the use of interactive audio teleconferencing as a means to provide training and education to participants located in varying locations.

The use of audio teleconference precludes the ability to see the instructor or the participants located at other locations. In light of the traditional concept of education, the lack of face-to-face contact between instructor and participants seems to create a barrier to learning. With this obstruction, the problem centers around the lack of face-to-face interaction and the effect it may have on

the attitudes of participants and the corresponding relationship to learning.

The audio teleconference system housed in the Department of Human Services is called the Central Information Delivery System (CIDS). The CIDS is used by the staff development unit as a training medium. Since 1979, there has been an increase in training offered using teleconferencing as the method for instruction. However, since its installation, a dissatisfaction concerning the lack of face-to-face interaction has been voiced by participants attending training via CIDS. Because of this concern, its effectiveness and the continued use of teleconferencing for training have become questionable.

Robert Keiper, a teleconferencing consultant in Stamford, Connecticut, states, "In the next few years, virtually everyone who is professionally involved in training will at least recognize it as an option in many applications."[1] It is essential for the trainers using teleconferencing to be knowledgeable regarding its capabilities and limits. Teaching methodology suitable for teleconference, target population in attendance at training sessions, adaptability of content to teleconference training are all variables which determine success or

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[1]Dick Schaaf, "Teleconferencing: Will it Change the Way You Train?" Training/Human Resource Development, July 1981, p. 60.

failure using this training medium.

Not only is it important for the trainer to be familiar with the appropriate teaching techniques for teleconferencing, but participants need to be educated in the proper uses of the medium, its capabilities and its limitations.

> As we continued this program, it seemed that success depended to a significant extent on the skills and adaptability of the trainer and the manner of presentation of material over the teleconference network. Not surprisingly, proper preparation in teleconference techniques and content is important to success. Although teleconferencing works well in many situations, you should approach it with caution. It can bridge the miles for training, but its ultimate success . . . requires that participants and trainers alike be adequately schooled. . . .[1]

An additional element in teleconference training is the realization that the trainees have preferences regarding the presence or absence of face-to-face contact. If the overall attitude toward the lack of face-to-face contact overshadows the benefits of saving time and money, is the teleconference method a viable alternative for instruction?

> Another problem which is often overlooked because of the strongly visual orientation of present western culture is that telecommunications can only represent the auditory and visual dimensions, although our total sensory awareness also includes tactile, gustatory, and olfactory dimensions. Removing these dimensions obviously precludes some

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[1]Sylvia L. McMullen, "Why Texans Love Teleconferencing," Training/Human Resources Development, Feb. 1982, p. 66.

> activities which are often associated with business meetings, such as shaking hands or sharing a meal.[1]

The research provided in this study provides educators the opportunity to determine whether continued use of teleconferencing as a training vehicle is a realistic alternative to face-to-face training sessions. Additionally, the research highlights the feasibility of the possible uses of limited face-to-face contact in combination with teleconference training. Further, this study will explore the relationship between attitude toward the medium and learning.

Research studies have been conducted regarding the use of teleconferencing as a training medium in comparison to face-to-face training and education. The research addressing achievement generally indicates that learning takes place using electronic-assisted instruction. The research varies when comparing attitudes of participants who attend training through teleconferencing and face-to-face.

If the lack of personal interaction effects learning, how should educators accommodate for that need? Educators designing training content for teleconferencing recognize its uniqueness when considering curriculum. It is in this initial design that face-to-face contact should be

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[1]Lesley A. Albertson, "Telecommunications as a Travel Substitute," Intercom: Readings in Organizational Communications (New York: Hayden Book Company, 1980), p. 303.

considered as a method to increase learning while still reaping the benefits that teleconference training offers. The results of this study will aid educators as they decide to use teleconferencing as an instructional medium and whether to incorporate face-to-face contact into the curriculum design.

The succeeding chapter underscores the importance of these questions by examining the research literature dealing with effectiveness and limitations of instructional audio and video media.

Limitations

The following limitations are conditions beyond the control of the researcher which may place restrictions on the conclusions of the study and its application to other situations.

1. The population and sample were based on the limitations placed upon the researcher by the employer in an attempt to not incur an excessive amount of expenses in travel. Those in the sample were not chosen on the basis of age, sex, job classification, length of employment, work location, or educational background. Their selection was strictly on a random sample basis given the population and its proximity to the central office teleconferencing equipment, trainer, and facilitators.

2. The criteria for attendance at training at the Department of Human Services is one of job-related training.

Therefore, the content was limited in that it was job related for a wide variety of persons in varying classifications.

3. This study was limited to the use of the teleconference system at the Iowa Department of Human Services and subject to the audio quality and equipment function at the time of the study.

4. This study was limited in that the researcher did not supervise nor have any control over those who were chosen in the random sample.

5. This study was limited to the participant behavior change in achievement and attitude.

Delimitations

The following are delimitations establishing the boundaries beyond which this study is not concerned.

1. This study was limited to the attitude and assessment instruments written by the researcher and received from those attending the training sessions.

2. This study was limited to the information which could be obtained through employee records regarding participant age, classification, length of employment, and work location. Information regarding educational background was not sought as it would have required that the trainer or facilitators ask the participants for the information, therefore, setting this study apart from the routine course offered as an in-service training session. The fear of

biasing the results restricted the gathering of information concerning the educational background of participants.

3. This study was limited to the trainer and facilitators chosen to assist in the design and delivery of the training.

4. This study was limited to the course content written by the researcher and trainer.

Definition of Terms

CIDS is the Central Information Delivery System which is the name for the teleconference equipment housed in the Iowa Department of Human Services in Des Moines, Iowa.

The Iowa Department of Human Services (IDHS) or (DHS) is the largest state agency. The organization is responsible for the provision of financial assistance, as well as children, adult and family services, and mental health to the citizens of Iowa. The department employs approximately 7,500 people. The training unit consists of fifteen employees who have responsibility for providing in-service training and education to the employees of the department.

Teleconferencing is an electronic means of communication using the telephone long distance lines as a delivery mechanism connecting two or more locations together enabling all to speak to one another. Persons at varying locations are able to communicate with one another via initial hook-up by public dial-up telephone and then switching to a microphone and speaker configuration.

Instructor and trainer will be used interchangeably.

Attitude is defined as a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner.[1]

Learning is defined as "a process which results from practice and which is reflected as a more or less permanent change in behavior."[2] For purposes of this study, learning represents the difference in pretest and posttest scores. Achievement and learning are used synonymously in this study.

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[1]Milton Rokeach, "Attitudes, Nature," International Encyclopedia of the Social Sciences, 1968 ed.

[2]Leonard Ross, "Learning Theory," International Encyclopedia of the Social Sciences, 1968 ed.

CHAPTER TWO

Review of Literature

The purpose of this chapter is to present a summary of the present state of knowledge concerning achievement and attitude as they relate to electronic media-assisted instruction. The literature review has been organized into three sections. First, teleconferencing as an educational medium; its uses, benefits and limitations is explained. Second is a review of the literature concerning learning behavior, attitude and adult education. Third is a review of literature detailing electronic media-assisted instruction including radio and audio-assisted instruction, television and video-assisted instruction, and finally, teleconferencing.

Finally, from the previously stated hypotheses, this chapter also identifies the rationale for utilization of teleconferencing as an effective medium of instruction.

Teleconferencing as an Educational Medium

The financial and human costs of education have caused trainers and educators to explore a variety of instructional delivery systems. The traditional method of face-to-face interaction has been challenged through the use of alternate

instruction methods. The present investigation is designed expressly to address teleconferencing as an effective alternative to face-to-face education.

Teleconferencing embraces any telephone method by which several individuals communicate from diverse locations. The most effective conferences are categorized as audio teleconferencing, audiographic teleconferencing, and video teleconferencing, which may include slow-scan video and high-speed or full-motion video.

Audio teleconferencing is simultaneous voice communication among two or more people over telephone lines. Typically, participants use telephones, portable microphone/speaker units or specifically designed rooms with built-in equipment for large audiences. Audiographic teleconferencing is the transmission of hard-copy data. Video teleconferencing is enhanced by more dramatic visual support such as slow-scan video, a method of transmitting still images over a regular telephone line for display on television monitors, or full-motion video, a transmission method that utilizes wide-band capabilities like microwave, cable, or satellite. With some video transmission, audio accompaniment is provided by a telephone connection synchronized to the image or by transmission via the satellite.

Teleconferencing can be treated as an additional style of communication; however, not as a substitute for face-to-face meeting. Users must determine if telephone communication

is a desirable and appropriate communication medium. According to Edward Murphy, an AT&T study of meetings and the ingredients necessary for their success revealed "that more than half of all business meetings held could be replaced by a teleconference."[1]

The temptation is strong to regain lost personal contact through the use of video transmission. This does not imply that without video teleconferencing, the full benefits of the transmission are lost; but rather, those involved in audio-only transmission must accommodate for this lack of face-to-face interaction. Video transmission via satellite and picturephones, the device which pictures the person speaking while using the telephone, are available for use for people who want to see the speaker. Computer conferencing lets users program visual or written material into home terminals for retrieval by persons in other locations. Electronic blackboards allow the viewer to see what another person is drawing or writing in a distant location.

> The advent of high quality teleconference receiving equipment has made it possible to conduct effective instructional programs by telephone. Through the efforts of a number of pioneers, the art of teleconferencing has been refined and has proved to be effective. Many universities, vocational schools, and federal agencies have been engaged in teleconferencing for many years. In addition to providing basic

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[1]"Teleconferencing: When the Next Best Thing to Being There Isn't Enough," Sales Manager's Bulletin, 1031 (1981), 3.

> instructional formats such as seminars and workshops, teleconferencing also has been used for administrative activities such as staff meetings and conferences, informational exchanges, staff training, and research project evaluations, for sales training and technical assistance to field representatives, and for a wide variety of public service programs.[1]

An additional use of teleconferencing is new employee orientation for organizations employing large numbers of people. Delores Davis, Training Director for the Iowa Department of Human Services states,

> Besides training, the Department also uses teleconferencing for new-employee orientation . . . Davis' organization provides first-hand explanations of such topics as job-related training and how to obtain it, how performance evaluations work, labor contract coverage, the Iowa merit system for recruitment and selection, job classification and its meaning to employees, and employee benefits.[2]

Utilizing teleconferencing has obvious benefits of saving time and money.

> Will it work? That depends on what you hope to accomplish. As a primary instructional medium, teleconferencing probably is not going to prove an effective alternative to more conventional methods of delivery. As an alternative to high-priced and burdensome travel, both for trainer and trainees, it has much more to commend it.[3]

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[1]Bronstein, Gill and Koneman, p. 1.

[2]"Teleconferencing: The Next Best Thing to Being There," Employee Relations and Human Resources Bulletin, July 1983, p. 9.

[3]Schaaf, p. 60.

In the journal article, "Teleconferencing: The Meeting of the Future--Now," Pye and Springate cite previous research which has identified the types of meetings for which teleconferencing is most satisfactory.

> These include transmitting factual information, giving orders, decision-making, settling a difference of opinion, and holding briefings. Meetings for which RMT (remote meeting table) is considered "equivocal" include bargaining, resolving conflicts, maintaining good staff relations, and persuading people.[1]

Task-oriented meetings seem to be more successful than contact-oriented meetings. Specifically identified purposes which involve a limited number of participants who know each other make teleconferences flow more smoothly. Attendees who are willing to change their behavior regarding the method utilized in convening educational activities appear to view teleconferencing as a viable alternative to face-to-face meetings.

Thomas Cross, president of Cross Communications, which offers teleconferencing planning, design, and consulting, states,

> The overall experience of people who try teleconferencing is encouraging. Participants agree that teleconferencing has a positive impact on the work environment and "management velocity," a

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[1]R. Pye and J. Springate. "Teleconferencing: The Meeting of the Future--Now," Management Services in Government, 33 (1978), 139.

> term we coined to describe the speed and effectiveness with which problems are solved.[1]

Dick Schaaf, in Training/Human Resource Development, cites drawbacks such as the lack of person-to-person interaction which, he hypothesizes, may lead to hostility among the participants because they are unfamiliar with each other.[2] Informal discussion is absent and spontaneous question and answer sessions are hard to generate. In audio-only transmission, no visual contact between the groups is possible, therefore, identification as a group and with the leader is difficult.

Teleconferencing is not the equivalent of the conventional conference. Social, psychological and operational differences in modes of communication differ between teleconferencing and face-to-face meeting.

> Psychologically speaking, participants converse with certain images in either audio or audio-video modes rather than with a person or group of people who are physically present. Members of each group involve membership of "I-thou" relations among themselves but relationship between the groups via individual links has some characteristics of "I-it" relationships. This

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[1]Thomas B. Cross, "Teleconferencing Can Reduce Need to Travel," The Office, April 1982, p. 115.

[2]Schaaf, p. 49.

> particular aspect of teleconferencing substantially influences the general behavioral pattern of the groups.[1]

Successful teleconferencing is dependent upon several components. "There are problems, but creative instructors can overcome them. Teaching techniques must be modified. Distribution of class materials requires good advanced planning."[2]

Vesprani and Veatch list three components which create a successful telecommunication interaction: the need for a strong commitment to communicate, an effective mix of media, each location must have much to gain from the others.[3]

Diane Dvorin writes in Association Management,

> The real challenge for association executives is knowing when to teleconference, which telemeeting formats and technologies to select, and most importantly, how to motivate conference participants to communicate through this medium effectively.[4]

> With the ever-present pressure on professionals to stay informed, a wide variety of continuing education experiences is desirable. In the

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[1]Pauline Y. B. Chan, "A Mode of Some Psychological Factors in Teleconferencing, Including Social Relationships, Participant Satisfactions and Group Performance," Second Annual Communications Conference--The Status of the Telephone in Education (Madison, WI: University of Wisconsin-Extension, 1976), p. 152.

[2]Bill Stewart and Bill Duffy, "Telenetworking," Community and Junior College Journal, 50 (1979), 22.

[3]Vesprani and Veatch, p. 15.

[4]Diane Dvorin, "Teleconferencing: Making it Work for You," Association Management, 33 (1981), 98.

> past, on-site workshops and seminars have satisfied the need for continuing education; however, when travel costs are high and budgets low, the telephone can be an important alternate mode for delivery of information to small groups located long distances apart.[1]

Instructional design requires an orderly approach which must take into consideration the nature of achievement and attitude of the adult learner. Although teleconferencing can be viewed as cost effective, it must also be utilized as a means to stimulate learning for the adult learner. For this reason it is important to consider the circumstances which are conducive to achievement.

The following review is a consideration of the literature addressing learning behavior and attitude, specifically as they effect the adult learner. The aspects of how learning occurs and the effects of attitude on learning are considered as important, especially when a variation of traditional classroom instruction is proposed.

Learning Behavior and Attitude

Educators are continually making efforts to create the best possible learning environment for students. They know that human beings acquire most of their human qualities through learning. Gagne defines learning as "a change in human disposition or capability, which persists over a period of time, and which is not simply ascribable to

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[1]Bronstein, Gill and Koneman, p. 1.

processes of growth."[1] Learning is exhibited through a change in behavior. This change may be an increased capability for some type of performance or it may be an altered disposition called "attitude" or "interest" or "value."[2]

The sets of circumstances which occur causing learning to take place are many. "There needs to be a viable mix of program design, subject content, instructor expertise, student interaction, and shared experience if optimum learning is to occur."[3] Learning may be categorized as primarily cognitive, the fixing of certain associations, or experiential, "drawing in from the outside and making that which is drawn in a real part of me."[4]

Rogers defines significant learning as having "a quality of personal involvement--the whole person in both his feeling and cognitive aspects being in the learning event."[5]

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[1]Gagne, Conditions of Learning, p. 3.

[2]Gagne, Conditions of Learning, p. 3.

[3]Darlene Weingand, "Telecommunications and the Traditional Classroom: A Study of the Delivery of Education," Teleconferencing and Electronic Communications, 3 (1984), 269.

[4]L. Siegel, ed., Instruction: Some Contemporary Viewpoints (San Francisco: Chandler, 1967), p. 38.

[5]Carl R. Rogers, Freedom to Learn (Columbus, OH: Charles E. Merrill, 1969), p. 5.

He continues,

> I believe that all teachers and educators prefer to facilitate this experiential and meaningful type of learning, rather than the nonsense syllable type. Yet in the vast majority of our schools, at all educational levels, we are locked into a traditional and conventional approach which makes significant learning improbable if not impossible.[1]

Instructional procedures for adult learners take account of the same learning concepts.

> Mature learners are likely to approach the learning situation with motivation already well established. They may be able to realize immediately what the expected outcome of learning should be (although information about objectives is often helpful in confirming their expectancy). They have learned to perceive the stimulus selectively. They have a variety of encoding schemes and cues for retrieval at their command. They make provision for their own performances, and are able to provide their own feedback. External events of instruction are frequently helpful, but evidently not essential, for the learning of these "truly sophisticated" learners.[2]

Education for the adult learner requires the use of both primary or cognitive and experiential theories of learning. However, what differs is the method in which these theories are practiced. Three unique characteristics, self-concept, experience, and time perception, have been identified by Knowles as distinguishing the adult learner from the child. Knowles identifies self-conception as the most important. "Andragogy is based upon the deep insight

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[1]Rogers, p. 5.

[2]Gagne, Conditions of Learning, p. 302.

that the deepest need an adult has is to be treated as an adult, to be treated as a self-directing person, to be treated with respect."[1]

Secondly, adults define themselves in terms of their experience and the educational process requires a connection between experiences and concepts being taught. The third characteristic is that of time perspective which requires that there be an immediate application for learning, and which causes the learning to be problem-centered.[2]

Adult educators must be alert to the needs of the adult learner.

> In recognizing that learners vary in previous learning experience and in capability and required time to learn, Gagne sees the desirability for a person to be encouraged to learn independently within an environment of group orientation and group guidance.[3]

Gagne writes,

> The design of effective instruction, then, has these two areas of knowledge to call upon. Instruction needs to be arranged so that it will bring about the kind of change in a student which is called learning, and this requires a consideration of learning theory . . . Putting ideas together from these two domains of

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[1]Malcolm Knowles, The Modern Practice of Adult Education: Andragogy Versus Pedagogy (New York: Association Press, 1970), p. 72.

[2]Knowles, p. 74.

[3]Virginia C. Martin, "The Effects of Presentation Format on Adult Student's Awareness of Learning and Involvement in Viewing a Television Instructional Program: A Controlled Laboratory Experiment," Diss. Univ. of Tennessee, 1977, p. 21.

> knowledge can yield some techniques and procedures of instruction which should make the process of learning an optimally effective one.[1]

Houle states that,

> Any educational activity, however brief or extended, has a distinctive shape or pattern which gives unity to its various elements. Each of them may be considered or planned separately and in any order, but a successful program requires a fusion of all such elements in terms of the situation in which the education occurs.[2]

Consideration must be made for the learner in providing a variety of relevant stimulation in which the learning may take place.

> Ideally, educational technology in higher education should seek nontraditional solutions to the problems of learning. An examination of the needs of the adult learner indicates that as the years past age eighteen (18) increase, the appropriateness of the classic college classroom model decreases and educational technology becomes increasingly relevant.[3]

Rogers asserts,

> When a teacher is concerned with the facilitation of learning rather than with the function of teaching, he organizes his time and efforts very

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[1]Robert Gagne, "Learning Theory, Educational Media and Individualized Instruction," Educational Broadcasting Review, 4 (1970), 51.

[2]Cyril O. Houle, The Design of Education (San Francisco: Jossey-Bass, 1976), p. 49.

[3]David Giltrow, A Report on Educational and Policy Specifications for a Metropolitan Learning Resources Service for the Chicago Region and a Parallel Improvement in Learning Resources Services for the City College of Chicago (ERIC ED 111 485), p. 1.

> differently than the conventional teacher. Instead of spending great blocks of time organizing lesson plans and lectures, he concentrates on providing all kinds of resources which will give his students experiential learning relevant to their needs.[1]

The provision of these resources must be in combination with the basic principles of sound education.

> The coordination of these elements constitutes what can be regarded as the "art" of teaching. Assessment is often limited to the subjective domain. Whether learning has taken place, however, is measurable, and if the educational design is held constant, a close examination can be made of the situation or delivery mechanism.[2]

Brown, Brown, and Danielson report,

> It appears that adult learners are responsive to an enthusiastic portrayal. The presenters must appear to be intrinsically interested in the subject matter themselves and eager to share the knowledge with the viewer. A bland presentation or one marked by apparent confusion yields negative attitudinal responses and can effect achievement. A friendly, self-assured, and confident portrayal is more positively received by the adult learner.[3]

For the instructor, the responsibility rests in the ability to design and deliver quality instruction in an interesting fashion without risking the formulation of

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[1]Rogers, p. 131.

[2]Weingand, p. 269.

[3]Robert D. Brown, Laurence A. Brown, and J. E. Danielson, "Instructional Treatments, Presenter Types, and Learner Characteristics as Significant Variants in Instructional Television for Adults," Journal of Educational Psychology, 67 (1975), 402.

negative attitudes by the students toward the method or topic of instruction. The challenge is examining more closely the relationship of teaching techniques and their effect on attitudes of the students.

A valuable definition is given by Allport:

> An attitude is a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related.[1]

Clegg reports in "Teaching Behaviors which Stimulate Student Motivation to Learn,"

> The basic contention of this study is that instructor success in stimulating student motivation plays an important role in instructional outcomes. Analyses lend strong support to that argument. Classes which rate an instructor high on motivating effort also tend to indicate greater progress on course objectives as well as a more improved attitude toward the field of study.[2]

It is not known if there is a cause effect relationship between learning and attitude.

> Expressive attitudes are aroused by cues associated with the individual's values and by the need to reassert his self-image and can be changed by showing the appropriateness of the new or modified beliefs to the self-concept.[3]

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[1]Gardner Lindzey and Elliot Aronson, Handbook of Social Psychology (Boston: Addison-Wesley, 1968), p. 63.

[2]Victoria L. Clegg, "Teaching Behaviors Which Stimulate Student Motivation to Learn," Diss. Kansas State Univ., 1979, p. 50.

[3]D. Katz, "The Functional Approach to the Study of Attitudes," Public Opinion Quarterly, 24 (1960), 163.

Milton Rokeach writes in the International Encyclopedia of the Social Sciences,

> it is not necessary to assume that the positive or negative affect associated with a belief or attitude is necessarily directed toward the object of the belief or attitude . . . the affect may also be directed toward other objects--individuals or groups who agree with us or oppose us with respect to the object . . . or it may arise from our efforts to preserve the validity of the belief itself.[1]

Many of our attitudes are learned as a result of a series of interactions with other people. Attitudes may be acquired or changed rather suddenly as a result of a single experience. La Piere discusses the absence of a relationship between attitude and behavior in his classic study detailing his travels throughout the United States with a Chinese couple. La Piere found that the face-to-face reception of the Chinese couple was favorable. When following the visits with a written questionnaire, the reactions of those responding was overwhelmingly negative regarding attitudes toward the Chinese.

> A rather unflattering interpretation might be put upon the fact that those establishments who had provided for our needs so graciously were, some months later, verbally antagonistic towards hypothetical Chinese.[2]

Attitudes vary from positive to negative. In writing

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[1]Rokeach, p. 451.

[2]Richard La Piere, "Attitudes vs. Actions," Social Forces, 13 (1934), 234.

of La Piere's research, Triandis reports,

> It would be naive, however to conclude from these results that there is no relationship between attitude and behavior. What should be understood is this: attitudes involve what people think about, feel about, and how they would like to behave toward an attitude object. Behavior is not only determined by what people would like to do but also by what they think they should do, that is, social norms, by what they have usually done, that is, habits, and by the expected consequences of the behavior.[1]

In summary, it is important to remember that learning is exhibited through a change in behavior. Conversely, attitudes are neither necessary nor sufficient causes of behavior.

> Behavior is a function of attitudes, norms, habits, and expectancies about reinforcement. When all four factors are consistent, there is consistency between attitudes and behavior; when the four factors are inconsistent, there is much less consistency.[2]

Attitude then, is determined by how the individual actually responds to a situation as well as how they think they should respond to a specific situation.

Electronic Media-Assisted Instruction

The results of research studies conducted over the past thirty-five years indicate that audio and video enhancements in an educational setting adequately provide for learning to

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[1]Harry C. Triandis, Attitude and Attitude Change (New York: John Wiley and Sons, 1971), p. 14.

[2]Triandis, p. 16.

take place. Audio tapes and audio-tutorial, video tapes and television have been found to perform as well or better on specific educational tasks when compared to the traditional classroom instruction. The review of the research provided in this chapter will highlight the major studies in media assisted instruction. Specifically addressed is the concern for the effectiveness of the media as a teaching tool and the attitudes of students as a result of exposure to instruction via electronic communications.

Radio and Audio-Assisted Instruction

"Since the advent of instructional radio in the 1920's, one way audio communication has been proven over the years to be an effective mode of instruction."[1] In the 1920's more than 200 radio stations were licensed to educational institutions for the purpose of distance education. By 1936, more than half of these had licenses transferred, revoked or expired.

> When radio was used supplementary to classroom instruction or as a special enrichment program, radio instructed students achieved as well as students taught in a conventional manner without listening to the programs. Questionnaire evaluations of teacher's attitudes toward radio instruction found positive assessments of the interest level of ratio instructed students and of the effectiveness of radio instruction.[2]

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[1]Lorne A. Parker and Mavis K. Monson, More Than Meets the Eye: The Effectiveness of Broadcast Audio and Two-way Audio Instruction for Distant Learning (ERIC ED 192 719), p. 7.

[2]Parker and Monson, p. 12.

Radio has been found to compare favorably with silent reading, teacher reading, and television. Numerous studies have been conducted to ascertain the level of effectiveness which stems from education via radio. "It must be noted, however, that many of the studies used imperfect statistical controls and often the amount of radio instruction was only for short periods of time or only supplementary to the teacher's regular curriculum."[1] However, there are enough studies relating to the effectiveness of radio to reasonably accept the conclusions of Forsythe and Banister.

Forsythe found that the effectiveness of auditory presentation is limited to meaningful material (as opposed to nonsense syllables), and tends to be superior for subject matter that is concrete and serial in nature.

> If other conditions are constant, the mental functions of recognition, verbatim recall, and suggestibility seem more effectively aroused in listening; whereas critical attitudes and discriminative comprehension are favored by reading. The human relationship involved in the auditory situation is of value for certain types of communication (e.g., aesthetic and humorous) where the personal factor customarily plays a role.[2]

Much of the basis for use of a variety of audio-visual aids in instruction is based on the premise that learning increases as the number of sensory channels employed in the

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[1]Parker and Monson, p. 17.

[2]Richard O. Forsythe, Instructional Radio: A Position Paper (ERIC ED 044 933), p. 9.

learning process increases.

> On the other hand the transmission of information through the auditory sense has advantages over vision in that the reception of information does not require specific muscular adjustments or head position. Sources of visual information are thus far more easily blocked than are auditory sources which may force themselves on the perceptual system of the person who is exposed to them.[1]

Banister found no significant difference in learning when comparing the mean scores of three tests given to two groups taking a history course. The experimental group participated by FM radio and illustrated syllabus. The control group used a combination of tapes, filmstrips, student response sheets and seminars. "A statistical analysis of the data determined that there was no significant difference at the 1 percent level of confidence in the learning of these two groups as displayed by their test scores."[2]

Parker, while noting the finding of no significant differences in learning in groups using radio and conventional instruction, points out several flaws in the research.

> It must be noted, however, that many of the studies used imperfect statistical controls and often the amount of radio instruction was

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[1]Forsythe, p. 9.

[2]R. E. Banister, Comparison of Two History Instruction Methods: Radio Broadcasting and Visual Aids Versus Individualized Instruction with Audio-Visual Aids (ERIC ED 032 783), p. 1.

> only for short periods of time or only supplementary to the teacher's regular curriculum . . . many of the studies are time dated.[1]

For this reason, it is necessary to consider also more recent studies attempting to assess the effectiveness of strictly auditory instruction through the use of audio tape, or audio tutorial in contrast to face-to-face conventional classroom instruction.

Anthony defines audio tutorial as the use of learning centers with various audio-visual materials with tutors. The instructor's voice was tape recorded for the students to hear. No differences were found in achievement in biology by students taught by audio-tutorial and those taught by conventional lecture method. No significant difference was found in the critical thinking ability of students taught, or in the attitude of students toward biology when comparing the audio-tutorial and the conventional lecture method of instruction. Additionally, Anthony found no significant interaction between the treatment and the ability levels with respect to critical thinking and biology achievement. Anthony concludes that the "audio-tutorial method of instruction was as effective as the conventional lecture method of instruction."[2]

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[1]Parker and Monson, p. 17.

[2]Robert J. Anthony, Sr., "A Comparative Study of an Audio-tutorial and a Conventional Lecture Method of Instruction in Biological Science Courses for Non-science Majors at Jackson State University," Diss. Univ. of Southern Mississippi, 1977, p. 60.

Geib and McMeen discuss the use of audio cassettes as a viable teaching method.

> Research has indicated that students learn as much from audio cassettes under certain conditions as from live lectures and they feel just as positive about their course and instruction. Further, research shows that there are no significant differences in post-test achievement scores or in student evaluation scores when a comparison is made between off-campus learning with audio recordings and on-campus learning using traditional methods at a university.[1]

Parker concludes by stating the advantages of using radio and audio assisted instruction as a supplementary to classroom instruction. "Radio instructed students achieved as well as students taught in a conventional manner without listening to the programs."[2]

In summary, Parker refers to the overwhelming results of the literature which state that radio is an effective method of instruction. However, generally imperfect statistical controls were used in the older studies. Forsythe states the effectiveness of radio depends on the material to be taught. Banister, addressing radio, and Anthony, addressing audio-tutorial, report no significant differences in achievement when compared to face-to-face instruction.

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[1]Peter Geib and George R. McMeen, "Professional Development and Audio-Assisted Independent Study in Mental Health," T.H.E. Journal, 11 (1984), 110.

[2]Parker and Monson, p. 12.

The research of Banister and Anthony support the hypotheses as stated in this study.

Television and Video-Assisted Instruction

As with learning via audio assisted instruction, the use of television as an educational medium has been successful. Numerous research studies have been conducted with the overall results indicating no significant differences in learning using television as compared to traditional classroom instruction. Schramm reports,

> However, when the usual tests of achievement used by schools to measure student progress are employed, it may be said with considerable confidence that in 65 percent of a very large number of comparisons between televised and classroom teaching there is no significant difference.[1]

In terms of attitude toward televised instruction, the reactions differ depending upon the age of the student. Elementary students think they learn more from TV classes, whereas high school and college students are more doubtful.[2]

> There is the suggestion that attitudes of college students may be described as being more favorable to TV classes in subjects where demonstrations are important (for example, natural science and art), but less favorable where student-teacher interaction and classroom discussion and drill are important (English composition and social studies).[3]

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[1]Wilbur Schramm, "Learning from Instructional Television," Review of Educational Research, 32 (1962), 158.

[2]Schramm. p. 160.

[3]Schramm, p. 162.

The following review addresses the area of learning via television and video tape as compared to face-to-face classroom instruction. Research regarding the use of instructional television has been conducted since the early 1950's. Herminghaus offered instruction in three subject areas: ninth grade general science, ninth grade English composition, and second grade spelling. He posed the following questions:

> Is it possible for a competent television teacher to teach large groups of students effectively without supplementary activities? Is it possible that the traditional pattern of classroom instruction can be modified so that an entirely new concept of teaching personnel, numerically and functionally, may be developed? How do students and teachers react to direct television teaching to large groups?[1]

The experimental group was slightly larger than that of the control group although there were no statistically significant differences between the groups on the pretest or on the final test.

> Students who thought they had learned more attributed the increase, for the most part, to the fact that television offered a much greater variety of materials and experiences than they would find in a regular classroom . . . The reason stated by the great majority who thought they had learned less was the lack of opportunity to ask questions and participate in group discussions and personal conferences with the teacher.[2]

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[1]Earl G. Herminghaus, "Large-Group Instruction by Television--An Experiment," The School Review, 65 (1957), 120.

[2]Herminghaus, p. 128.

Hegar compared the career interests, locus of control, attitude, and achievement scores of community college "Introduction to Business" "on-campus" students and "open-circuit instruction" students. The open circuit television group scored significantly higher in the achievement post-tests when compared to the conventional classroom group. There was no significant difference in the attitudes of the groups toward business.[1]

In disagreement with the conclusions of Hegar, Brown, Brown and Danielson wrote the article entitled, "Instructional Treatments, Presenter Types, and Learner Characteristics as Significant Variants in Instructional Television for Adults." The authors cite a finding of no significance in the study.

> Television segments produced to examine the effects of involving the viewers actively by having them label key elements of a graph were not significantly more effective as indicated by achievement scores than were television segments not requesting the learner to be physically active.[2]

Blumberg compared the use of open circuit instructional television with small class conventional instruction on high, average, and low ability students' achievement in

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[1]Kathryn Weige Hegar, "A Comparison of the Career Interests, Locus of Control, Attitude, and Achievement Scores of Community College Introduction to Business 'On-campus' Students and 'Open-circuit Instructional Television' Students," Diss. North Texas State Univ., 1977.

[2]Brown, Brown and Danielson, p. 399.

elementary statistics. The televised method consisted of thirty taped lectures of thirty minutes covering new material. The instructor was available via phone to answer questions. The conventional classroom met forty times for fifty minutes.

> the mean achievement of the students in the IT (conventional instruction) class was significantly higher than those students in the ITV (instructional television) overall and at high and average ability levels. Although the difference was not statistically significant for low ability students, the advantage was in favor of the IT students.[1]

Blumberg's findings differ significantly with the majority of previous research in the field. Causes for the differences have been due to the absence of a random sample. Students were allowed to choose the class of their choice. Additionally, the drop-out rate of the instructional class was 23.6 percent as compared to the 15.8 percent in the face-to-face class.

Blumberg cites the literature surrounding the use of television as an instructional medium.

> The years 1945 to 1970 comprised two and one-half decades of intense research in instructional media. During this period over 800 studies were conducted which compared student achievement in conventional classrooms with that of instructional television, radio, or films. Of the approximately 800 studies

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[1]Larry D. Blumberg, "A Comparison of Open Circuit Instructional Television with Small Class Conventional Instruction on High, Average, and Low Ability Students' Achievement in Elementary Statistics," Diss. Kansas State Univ., 1978, p. 30.

> mentioned above, about 300 of those were done at the college level. Of these 300 studies about 15 percent had results favoring conventional teaching methods, 80 percent showed no significant differences and 5 percent had results favoring instructional television.[1]

Robert Davis, Craig Johnson, and John Dietrich explain that most studies have found no significant differences in amount learned when comparisons are drawn between television and non-television courses. Student attitudes are affected by their acceptance of instructional television, the attitude toward the course content, and the attitude toward the environment. Based on 3,932 students in twelve courses, the following conclusions were made:

> The over-all distribution of grades of students who saw lectures live was not significantly different from students who saw lectures on TV . . . The course-by-course inspection of the data revealed that student attitudes in TV sections were highly dependent upon the quality of the lecturer and the type of course being offered.[2]

The authors summarized their results,

> it is possible to offer the following tentative hypotheses: On the whole, student interest and attention appear to be about the same whether a course is seen on TV or live. Furthermore, students in TV sections seem to feel they learn about as much as those who see the course live.[3]

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[1]Blumberg, p. 8.

[2]Robert Davis, Craig Johnson and John Dietrich, "Student Attitudes, Motivations Shown to Influence Reception to Televised Lectures," College and University Business, 46 (1969), 60.

[3]Davis, Johnson and Dietrich, p. 61.

Thompson and Frazer conducted research using video cassettes in comparison to face-to-face instruction. In both examples a finding of no significant difference in learning was concluded.

Thompson's study, "An Investigation of the Instructional Effects of Interactive and Non-interactive Videotaped Instruction on Adult Learners," found no significant difference between the treatment groups in terms of learning performance. Additionally, no correlation was established between the non-interactive and interactive learning modes.[1]

Frazer used individualized instruction with video cassettes in comparing face-to-face instruction.

> The purpose of this study was to determine the attitudes and achievement of students in courses offered on a self-paced, individualized basis through the use of video cassettes in comparison to students in the traditional lecture classroom approach.[2]

Frazer's extensive review of literature supports his findings; there was no significant difference in attitudes and achievement of those participating in the study.

The results of Herminghaus, Brown, Brown and Danielson,

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[1]Phyllis Goldman Thompson, "An Investigation of the Instructional Effects of Interactive and Non-interactive Videotaped Instruction on Adult Learners," Diss. Catholic Univ. of America, 1975.

[2]Gary W. Frazer, "A Study of the Attitudes and Preferences of Students Enrolled in Library-Based Telecourses," Diss. Northern Illinois Univ., 1979, p. 3.

Thompson, Frazer, and Davis, Johnson and Dietrich cite no significant differences in achievement in studies conducted using television or video-cassettes. Likewise, Hegar and Frazer cite no significant differences in attitude toward the method of instruction. Hegar and Blumberg differ from the cited studies with the finding of significant differences in achievement, in which the television group experienced greater learning. The findings of Herminghaus, Brown, Brown and Danielson, Thompson, and Frazer support the research hypotheses stated in this study.

Teleconferencing

The number of studies which have been conducted utilizing interactive audio teleconferencing are limited in number. The studies which have been completed in the area of teleconferencing have concerned themselves with either a comparison of telephone conferencing with relation to other methods such as radio, television, audio and video cassette tapes and face-to-face. Others have simply provided a description of the teleconferencing method, with no visible empirical base on which to ascertain its effectiveness.

The following studies address learning and attitudes of learners toward audio teleconferencing as an instructional method. In some instances teleconferencing was studied in combination with other media. All the research cited compares teleconferencing, with or without other media,

with face-to-face conventional instruction. Of these studies, eight are supportive of the research findings reported in this study concerning achievement by participants in teleconference instruction. Two studies support the results of this study stating that there is a significant difference in attitude of participants toward the method of instructional delivery.

Blackwood and Trent found no significant differences in learning between groups attending either a teleconference session or face-to-face. Their research studied the effectiveness of class lecture as compared to telelecture and the association between the amount learned and the personal and situational factors of age, level of education, time of day, and attitude.

> Pretests and posttests collected level of knowledge and personal information from seventy-one women during a short course on Money Management given by University Extension Specialists in Reno County. The sample was randomly divided in an experimental and control group.[1]

It was concluded that either teaching technique could be used resulting in similar amounts of learning.

Frye hypothesized that there would be no differences in the achievement scores and the attitudinal predispositions

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[1]Helen Blackwood and Curtis Trent, A Comparison of the Effectiveness of Face-to-Face and Remote Teaching in Communicating Educational Information to Adults (ERIC ED 028 324), p. 1.

of students enrolled in telelecture and traditional classroom lectures. He concluded that there was no significant difference in achievement between the two groups.

> Perhaps the main generalization suggested by these results is that students who profited most from instruction via telelecture exhibited more personal independence than those who profited least. The conclusion was supported by the three attitude statements described and the learning preference statement denying the importance of having the instructor able to see the student.[1]

The attitudinal preferences exhibited by the students who profited most from the telelecture indicated that the primary concern of the students was that the lectures were by an articulate expert and they liked having well-organized presentations from the instructor. "The low profit group was more likely than the others to rate as helpful, 'having the instructor able to see me.'"[2]

A finding of no significant difference in attitude and achievement was the result of a study by Brenden.[3] A telelecture, an amplified telephone, in conjunction with

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[1]David William Morley Frye, "The Effectiveness of the Amplified Telephone as an Educational Delivery System," Diss. Kansas State Univ., 1972, p. 49.

[2]Frye, "The Effectiveness of the Amplified Telephone as an Educational Delivery System," p. 48.

[3]Daniel Brenden, "A Comparison of Face-to-Face and Telelecture Interaction Sessions when Presenting a Teaching Methods Course by Telelecture," Diss. Univ. of Missouri-Columbia, 1975.

reference materials and audio visual aids and the traditional classroom served as the control and experimental groups. The study used a random selection process with a sample size of forty-five students participating in a course entitled "Principles of Teaching Industrial Subjects."

Rushton found no significant difference in learning when studying the achievement of students in teleconferencing and face-to-face courses teaching the use of complex skills. The presentation was made available to students via audio lectures on audio tape while visual images were shown to students. A proctor was present to operate the audio tape player and slide projection equipment.

> The result was no significant difference as measured by the terminal learning objective test, between conventional instruction in complex manipulative skills and remote delivery of instruction through teleconferencing to a network of widely dispersed small groups or to a large group in one location.[1]

> Consideration of teleconferencing's feasibility as an instructional medium involves effectiveness, equipment availability, and cost. In the present study, failure to find a significant difference between conventional instruction and teleconferencing suggests that teleconferencing is an effective medium for attainment of complex skills.[2]

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[1]Albert F. Rushton, Jr., "Teleconferencing Versus Conventional Delivery of Instruction in Complex Skills," Diss. Florida State Univ., 1981, p. 25.

[2]Rushton, p. 91.

Weingand reports her findings in Teleconferencing and Electronic Communications. A finding of no significant differences in learning resulted from the study of students participating in "Public Library Administration" offered at the University of Wisconsin using the teleconferencing system (ETN) and conventional classroom methods of instruction. She summarizes,

> There is no evidence to support the popular belief that the classroom is assumed to provide the optimum model for delivery of education. Telecommunications (ETN) delivery of an educational experience can facilitate learning in equal or better measure than classroom instruction. The absence of face-to-face interaction and the substitution of teleconferencing interaction is not detrimental to the learning process.[1]

Research conducted by Puzzuoli utilized a teleconference system using a dedicated line in the course "Mine Engineering and Modern Math." The method used telelecture and telewriter, the transmission of written messages which are projected onto a screen, and conventional face-to-face classroom. Puzzuoli found a significant difference in both the attitude and achievement of those participating.[2]

Causes for the finding of significant differences are due to several factors which should be mentioned. The study was not conducted using a random sample procedure and

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[1]Weingand, p. 274.

[2]David A. Puzzuoli, A Study of Teaching University Extension Classes by Telelecture (ERIC ED 042 961).

the population size, forty-eight, was not conducive for accurate results. The results of the first course citing a significant difference appear mislabeled when comparing fifteen telelecture students to four face-to-face students. The second course did not compare the telelecture course, thirteen students, with any students taking the course face-to-face. The third course consisted of twenty students participating in an independent study and twenty students participating in face-to-face instruction.

Further, the attitude assessment asked specific questions regarding the method of delivery of instruction. The questionnaire stated,

> It is imperative that West Virginia University collect relevant data on the tele-lecture method in order to plan future use of the method . . . In completing the questionnaire, you should keep in mind that we are evaluating the tele-lecture method only. The tele-lecture method is being defined as including the electro-writer.[1]

By disclosing to those participating in the course that the method of delivery was to be considered in the evaluation, it is not surprising that the responding group preferred tele-lecture to driving the approximately 250 miles for an on-campus course. Those enrolled were employed full-time when participating in the courses.

Puzzuoli concludes,

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[1]Puzzuoli, p. 63.

> The data appear to support the thesis that the success of teaching university extension classes by tele-lecture is greater when a professor: (1) limits continuous lecturing on the system to 20-25 minutes, (2) provides a number and variety of printed materials to the class, (3) utilizes contemporary audio-visual techniques/methods to supplement the class, (4) makes an appropriate number--two or three--of personal visits to the tele-lecture classroom and (5) bases the instruction upon the problem-solving technique.[1]

Haaland and Newby describe student perception of effective teaching behaviors in their study. The two authors utilized a teleconference and classroom setting as the basis for the study. Of concern to the experimental group was the lack of observing behaviors which are demonstrated by effective teachers.

> Many behaviors that contribute to effective teaching are visual rather than verbal. Eye contact, facial expression, gestures with hands, arms or body, and physical movement within the classroom while lecturing are positively correlated with high teaching evaluation.[2]

The authors concluded, "the delivery mode itself whether teleconference-based or conventional, had no effect on the student's rating of the instructor's ability."[3]

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[1]Puzzuoli, p. 64.

[2]Bonnie A. Haaland and William G. Newby, "Student Perception of Effectiveness Teaching Behaviors: An Examination of Conventional and Teleconference-Based Instruction," Teleconferencing and Electronic Communications, 3 (1984), 211.

[3]Haaland and Newby, p. 216.

In an attempt to evaluate the effectiveness of telecommunications mode in contrast to a central site mode of instruction, Carey and Israelite proposed to determine the effectiveness of satellite assisted interactive teleconference. Those surveyed learned new information, new contacts were made, they became aware of deficiencies in the social service system, and were able to take steps to establish an interagency network. The goal of the teleconference format was to explore the suitability for achieving the cognitive and affective goals of information sharing, networking with other social service professionals, and to improve the attitudes regarding social service agencies dealing with troubled youth.

Seventy-two percent of those participating thought teleconferencing would be positive. Following the conference, the percentage rose to 83. Sixty-nine percent thought teleconferencing was a good substitute for traditional face-to-face conference. Seventeen percent were undecided.[1]

Research has been conducted involving the use of teleconferencing and additional sources of media assisted instruction. Henrie and Whiteford, Berdiansky and Keller

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[1]James C. Carey and Larry Israelite, Satellite Teleconference in Networking for Interagency Collaboration: An Evaluation Report (ERIC ED 189 091), p. 21.

and Kuramota conducted research which found no significant differences in learning using teleconferencing in conjunction with another medium of instruction.

Henrie and Whiteford proposed to study the alternatives of face-to-face supervision of home economics teachers through use of audiotapes and teleconferences. Both groups received normal on-site supervision early in the quarter. The experimental group participated in a teleconference in lieu of the second on-site visit received by the control group. "The results revealed positive reactions to teleconference, slight variations in lesson plans, and classroom interaction between groups, and financial savings and fewer working hours with teleconference."[1]

Approximately 80 percent of the supervisory teachers were positive in their evaluation. Slightly more than 60 percent of the student teachers indicated positive attitudes toward the teleconference.[2] No significant differences were found in any pattern of change in the formulation of written lesson plans between the on-site and teleconference group and in the pattern of classroom interaction in the different groups.[3]

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[1]Helen H. Henrie and Emma B. Whiteford, The Teleconference. A Supervisory Procedure in Educational Clinical Experiences (ERIC ED 160 761), p. 6.

[2]Henrie and Whiteford, p. 15.

[3]Henrie and Whiteford, p. 16.

Berdiansky and Keller utilized four methods of instruction in their study: audio teleconferencing, audio teleconferencing and video tape, slowscan and audio teleconferencing and face-to-face.

> Findings on outcomes indicate that significant gains in knowledge were experienced by the trainers. In all the types of training used, however, there was no significant difference in knowledge acquisition among the various types themselves.[1]

When specific comments were analyzed, it was found that "some trainees were uncomfortable talking to what they call a 'box.' They wanted the trainer present in the room, or at least, pictures or videotape of her so that they could tie the voice they heard to an image."[2]

Kuramota compared the use of audio teleconference, independent study method and face-to-face instruction. "Learning was associated with all three delivery methods . . . There were no significant differences in learning by 'live' class and WETNET participation in four of the courses."[3] Additionally, her research elicited a significant difference in attitude toward the instructional delivery method. "The major differences appeared to be between the

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[1]Harold Berdiansky and Jan Keller, "Telecommunications Training of Child Day Care Workers: An Evaluation," Teleconferencing and Electronic Communications, 3 (1984), 228.

[2]Berdiansky and Keller, p. 228.

[3]Alice Kuramota, "Teleconferencing for Nurses," Teleconferencing and Electronic Communications, 3 (1984), 265.

WETNET and 'live' methods."[1]

A further review of the research highlights the work of Kirman and Goldberg. In their research involving student teacher telephone conferencing, the authors proposed the following questions:

> How would student teachers supervised with telephone conferencing compare to another group of student teachers supervised in a face-to-face manner as evaluated by their cooperating teachers? How would pupils taught about Landsat maps by the above two groups compare with each other? How would the student teachers in each group rate their experiences with the two modes of supervision? What are some variables that influence telephone conferencing as a supervisory tool in student teaching?[2]

The authors concluded that the telephone group received better global evaluation from their cooperating teachers than did the control group. Additionally, the students of the telephone group obtained a higher mean score on the test requiring them to point out specific locations.

Following the student teaching experience, the students were to complete the Supervision Evaluation Form (SEF). Results from these questionnaires suggest that the telephone group perceived a deficiency in interaction with others during supervision and that they were not treated on

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[1]Kuramota, p. 267.

[2]J. M. Kirman and J. Goldberg, "Student Teacher Telephone Conferencing with Satellite Maps as a Monitoring Device," The Alberta Journal of Educational Research, 25 (1979), 276.

an individualized basis. Most students participating in the study indicated they would reject telephone supervision even when the alternative was infrequent face-to-face supervision.[1]

The authors conducted a follow-up study which incorporated the use of one-way television in which the participants could see their instructor and the small groups could interact with one another. The results of the study suggested that the television-telephone mode was acceptable as a means for inservice delivery by a majority of participants, it was viewed as undesirable by a substantial minority of teachers. From the evaluation questionnaire, the television-telephone mode received significantly better ratings on physical comfort and convenience than the face-to-face mode.[2]

These studies have approached teleconferencing with diverse measurement methodologies and techniques. Nevertheless, the overwhelming results serve to illustrate that the use of electronic assisted instruction enhances the learning experience and in some cases, exceeds that of the

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[1]Kirman and Goldberg, "Student Teacher Telephone Conferencing with Satellite Maps as a Monitoring Device," p. 281.

[2]J. M. Kirman and J. Goldberg, "Distance Education: Simultaneous One-Way Television and Group Telephone Conferencing for Satellite Map Instruction," The Alberta Journal of Educational Research, 28 (1982), 54.

conventional face-to-face classroom.

Eight of the cited studies found no significant differences in achievement which support the hypotheses as stated in this study. These researchers, Blackwood and Trent, Frye, Brenden, Rushton, Weingand, Henrie and Whiteford, Berdiansky and Keller, and Kuramota compared teleconferencing and face-to-face instruction. Of these, only Brenden found no significant difference in attitude of the participants toward the instruction method. Findings of significant difference in attitude were reported in the research of Puzzuoli and Kuramota. These two studies support the finding of this study of significant differences in attitude toward the method of instruction.

Carey and Israelite and Kirman and Goldberg presented findings that suggest the use of teleconferencing can create a positive learning environment for students and is as effective as the face-to-face mode of delivery in instruction and communicating information.

CHAPTER THREE

Methods and Procedures

The hypotheses of this study concern the attitude and learning of participants in training sessions offered in four methods: face-to-face instruction and teleconferencing or a combination of each. Additionally considered was the relationship between the attitude toward the method of instruction by the participants and the amount of learning acquired.

Three design considerations of importance to this study were: (1) identification of the population to be represented in the study, (2) the selection and development of the course to be offered, and (3) development of the measurement instruments designed to assess attitude and learning.

Sampling

The 412 Department of Human Services (DHS) employees in the Des Moines district office composed the population from which the sample was taken. The Des Moines district office was chosen for sampling due to monetary considerations when attendance, time and travel were required. The Des Moines district office is located in Des Moines, Iowa,

and includes Polk County and the surrounding seven counties. The district office is one of eight offices located statewide.

Demographically, IDHS statewide is made up of 7,240 employees. The Des Moines District composes 6 percent of the employees in the Department of Human Services. Women account for 72 percent of the employees in the Department, men, 27 percent. The Des Moines District employs 81 percent women as compared to 18 percent men. The sample was made up of 84 percent women and 16 percent men.

All job classifications were represented in the sample; social worker, income maintenance worker, clerical/support worker, and supervisor. Length of employment varied from one year to approximately thirty years which is representative of the Des Moines District and the Department as a whole. As stated in the limitations, research concerning these demographics was not considered in this study, but rather appears in the recommendations for future research.

In order to complete the study, permission was sought from the management staff of the DHS. Permission was obtained from the Director of Personnel, the Des Moines District Administrator, the Assistant Commissioner and the Deputy Commissioner for the Department.

Of the 412 employees in the population, ninety-six were randomly selected to participate in the study. The selection was made from a master listing of employees in the

district ordered by the district office followed by the eight counties listed alphabetically. Participants were randomly assigned to each of the four treatment groups. Twenty-four were chosen for each group as it was determined to be a manageable size for both the face-to-face and teleconference training. A lesser number of subjects would not allow for the optimum interaction and participation among those attending, particularly when utilizing teleconferencing.

The four treatment groups were: (1) teleconference followed by face-to-face, (2) all face-to-face, (3) face-to-face followed by teleconference, and (4) all teleconference. Each of the treatment groups utilized the same instruction content, instructor, and instrumentation. Only the method of delivery was varied.

The content was divided into three segments consisting of the introductory activities, the skill building activities, and the closing activities. No two groups were exposed to the three segments in the same manner. Outlined in Table 1 is the course presentation method for each treatment group.

Those who were selected to participate in the study were required to attend. The seven county directors and the key administrative staff of the district office met with the researcher to better understand the nature of the study. Agreement was obtained to refer to the study as a

pilot course offered by the department's training unit and not as a research study. This was to avoid the possibility of the Hawthorne effect if individuals became aware of their presence in a study.

Table 1

Treatment Groups by Course Presentation Method

	Method	
Group	Teleconference	Face-to-Face
Telecon/F-F	Introduction	Skill Building Closing
Face-to-Face		Introduction Skill Building Closing
F-F/Telecon	Skill Building Closing	Introduction
Teleconference	Introduction Skill Building Closing	

When an assigned individual could not attend, permission was first obtained from the supervisor to allow for the absence from the training. A substitution was made by using the next name from the list. Before notifying the individual, the supervisor of the substituted individual was notified for approval for attendance and assurances were obtained that the replacement could attend the training. This substitution process allowed for the replacements

to come from the same county location as the previously sampled individual.

An additional concern was the scheduling of a district meeting involving all the non-supervisory staff which could possibly conflict with the study. The management staff requested that no one individual be assigned as a substitute who was previously required to attend the district meeting that month. In this case, if the substitute was scheduled to attend the district meeting, the following name on the list was used as the substitute and the same procedure for notification was used.

Course Selection and Development

Course development was based upon feedback and suggestions received from the supervisory staff of the Des Moines District following a request for suggested training needs. Guidelines for the content required that the course be generic in nature, that is, appropriate for all levels and occupations represented in the sample. The course was to be approximately three hours in length to accommodate for travel to and from the instruction location during the working day. The course content was also based upon suggestions from the trainer who was employed to provide the instruction.

The individual chosen to instruct the course was employed by Northwestern Bell in Des Moines and had not previously provided training for the Department of Human

Services. To avoid bias, it was necessary to have the instruction provided by a trainer who did not know the personnel to be trained. Additionally, the trainer had some knowledge of the teleconference system due to her position at Northwestern Bell. Her background as a seminar leader in the area of communications made her an acceptable choice as instructor.

The researcher wrote the majority of the content for the study with feedback and suggestions from the trainer. After the first draft was written, a group of three staff reporting to the researcher participated in the training with the trainer. Comments were solicited and modifications were made.

Following the second draft of the contents, a pilot was offered to volunteer participants in the central administration offices. The researcher provided the instruction as the trainer was unable to attend. In attendance were those persons who had been chosen to be the teleconference site facilitators.

Following the second offering of the course, revisions were made and the content was prepared for the study. Each participant was to have a picture and resume of the trainer if teleconferencing was involved as a method of delivery. Also included for participants was a list of other attendees, the course content, and the assessment instruments.

The course was named "Communicating a Positive Image." The introductory activities included a warm-up activity, introduction of the participants, and the administration of the pre-test. The skill building activities involved the explanation of the course purpose and objectives, information and practice in the skills of self-expectancy, self-image, self-motivation, self-dimension, self-concept and assertiveness. The closing activities included a 16mm film, post-test, and the attitude evaluation.

The course was offered once for each group. The groups using teleconferencing were located in the Grimes State Office Building, the Ankeny Area Education Agency office, the West Des Moines office, and the Des Moines District office. A facilitator was assigned to each teleconference site during the instruction. Displayed in Table 2 is the configuration of the groups.

The facilitators were chosen based upon their knowledge of both training and use of the teleconferencing system. Since the facilitators were present in the second pilot offering of the course, they were aware of the content, could answer questions and distribute materials, and handle problems if necessary. Illustrated in Table 3 is the method used to deliver the instruction.

Table 2

Location and Number of Participants in Training Sites

Group	N	Location	Number
Tele/F-t-F	23	West Des Moines	6
		District Office	5
		Grimes Building	6
		Ankeny	6
Face-to-Face	20	Hoover Building	20
F-t-F/Tele	23	West Des Moines	6
		District Office	6
		Grimes Building	6
		Ankeny	5
Teleconf	22	West Des Moines	5
		District Office	5
		Grimes Building	7
		Ankeny	5

Table 3

Length of Presentation for Treatment Groups

Group 1	April 17	Teleconference	3 hours
	April 18	Face-to-face	1 hour
Group 2	April 25	Face-to-face	3 hours
Group 3	April 26	Face-to-face	3 hours
	April 27	Teleconference	1 hour
Group 4	April 30	Teleconference	3 hours

Instrumentation

The attitude assessment instrument was developed through a series of steps involving qualitative research, literature review and pre-tests. A survey of existing instruments was made. Fifty-two letters were mailed to business and industries which represented the leaders in the field of teleconferencing and telecommunications. Six responses were returned with sample evaluation instruments included. Thirteen responded that they did not provide internal teleconference training and consequently had no evaluation instrument. Ten were returned as being undeliverable.

An additional search of research and literature was made to ascertain whether previous research had been conducted which might lend itself to the attitude evaluation of teleconference training.

Extensive reading in research design was required to develop the appropriate type of assessment tool for use. It was determined that a closed questionnaire should be developed using a five-point rating scale. Those attending the training who had attended other DHS sponsored training were accustomed to completing training evaluation forms using a nine-point scale with one as the least favorable and nine as the most positive. In this case the one was the least favorable and the five was the most favorable.

The assessment instrument consisted of thirty-one

closed questions followed by three open-ended questions. A copy of the questionnaire is included in the Appendix. The thirty-one questions made up the attitude assessment results for the data analysis, the three open-ended questions were not included in the data analysis. The open-ended questions were included for purposes of future analysis regarding the use of teleconferencing. Only the closed questions were included in the analysis. The assessment was two pages in length printed back-to-back with the second page containing the open-ended questions.

Additionally, the pilot group which helped to evaluate the course content provided suggestions regarding the design. The staff of the researcher was asked to provide feedback and suggestions as to the adaptability of the instrument to both the media of teleconference and face-to-face training. An additional source for feedback was a graduate class in curriculum and instruction which provided suggestions as to the clarity of the tool.

The attitude assessment was divided into four segments. The first five questions addressed content. The questions concerned depth, usefulness, and organization of content, helpful learning supplements, and newness of concepts taught. Questions six through seventeen addressed the method and organization. These questions concerned the physical classroom, function of the equipment, and method of course presentation. Five questions were asked which

required a yes or no response only. These questions concerned the site representative, the length of the course, time of day, size of class, and travel requirements.

Questions eighteen through twenty-eight were for instructor assessment. These questions included instructor preparation, sensitivity to participants, knowledge, enthusiasm and teaching style. The last three questions concerned the personal significance to the participant. These questions specifically dealt with the concepts taught as they were able to be practiced in the work setting.

It was considered important not to include a question specifically dealing with teleconferencing. From past experiences in teleconference training, participants at DHS have generally expressed negative reactions to teleconferencing. It was determined that the assessment should not call attention to the teleconferencing system as a training medium.

Four questions were written and considered to be the most important regarding the attitude and reaction to teleconference and face-to-face training. Those questions were embedded in the method and organization section of the assessment. They were "I like the way the course was presented," "I liked the introductory activities," "I liked the skill building activities," "I liked the closing activities." These questions were deemed to be the most important as the course activities were presented

differently in each of the treatment groups.

The pre-test and post-test were developed to determine the amount of learning taking place in the training. A copy of the pre-test/post-test is included in the Appendix. The instrument was written based on the content of the course. The course was written as a detailed script and the test questions were taken from the text verbatim. The trainer knew which of the content segments were included as questions.

The questions consisted of definitions of the key concepts taught in the course. The pre- and post-test were used in both the pilot offerings and revisions were made based on participant comments.

After the final revisions were made the pre- and post-tests were used at the beginning and end of the course to measure the differences in scores obtained by the participants. The test consisted of fifteen questions which were multiple choice. There were four possible choices for each question. The results of these test scores provide the basis of the achievement analysis.

During the training the trainer and facilitator referred to the pre- and post-test as a pre- and post-activity rather than as a test. Generally those who attend training sponsored by DHS are not tested and it was thought that a pre- and post-activity would be better received than a test.

Data Analysis

The data was analyzed using a one-way analysis of variance. If the findings were significant, a Tukey was employed to determine which groups were significantly different. The analysis of the data appears in the next chapter.

CHAPTER FOUR

Analysis of the Data

The purpose of this study was to investigate the effects of the presence or absence of face-to-face instruction in conjunction with audio-only teleconferencing. The hypotheses address the relationship of attitude toward the method of instruction and its relationship to learning. Attitude of participants was measured by an attitude assessment and learning was measured by the difference in pre- and post-test.

The purpose of this chapter is to present the findings resulting from analysis of data based upon the two sources, the attitude assessment questionnaire and the pre- and post-test. In this chapter the null hypotheses will be accepted or rejected in relation to the attitude assessment and the pre- and post-test scores. Each section will consist of the following: statement of the null hypothesis, summary tables of the statistical treatment of the data, acceptance or rejection of the hypothesis, reported level of significance and brief narrative.

The attitude assessment consisted of thirty-one closed questions and three open-ended questions. The closed

questions were divided into four major sections labeled content, method and organization, instructor, and personal significance. The responses to questions were to be rated on a one to five scale with "1" signifying never or no and "5" as always or yes. A copy of the instruments is in the Appendix.

The content section of the attitude assessment consisted of five questions regarding the scope and depth of the material, usefulness of information, clarity of handouts and value of the concepts as new material. The method and organization section included twelve questions concerning the learning environment, audio and video equipment, preference in the way the course and various activities were presented, value of the site representative, and length, time, size of the group and travel preferences.

The instructor portion of the attitude assessment consisted of eleven questions relating to instructor preparation, explanation of concepts, answering questions and sensitivity to responses of participants, ability to provide practical examples, keeping the group on track, enthusiasm and teaching style. Personal significance was comprised of three questions which concerned the understandability of the course and the relationship of the content to job performance.

The open-ended questions were not included in the data analysis. The questions were "What did you like most about

the course?", "What did you like least about the course?", "What recommendations would you make about future courses on this topic?" The attitude assessment was given to each of the participants following the training regardless of group or method of training.

The pre- and post-test were identical and given prior to and after the instruction was completed. The test consisted of fifteen questions. The questions were based on the course content and were taken verbatim from the script of the course. The questions consisted of definitions of key terms discussed in the training. The test was multiple choice with a possible four choices. A copy of the test is included in the Appendix.

The sample size for this study was ninety-six. Due to illness and emergency situations, the final sample size was eighty-seven. The assignment into the four groups was on a random basis. The first group participating in the training via teleconference and then face-to-face consisted of twenty-two participants; the second group, twenty participants, had all training face-to-face. The third group consisted of twenty-three participants who had face-to-face followed by teleconference training. The all teleconference group was group four, consisting of twenty-two individuals.

The analysis on the attitude assessment was performed using three statistical tests. The first analysis was to determine whether there was a difference in attitude between

the four groups. The second series of analyses compared participant attitude between the groups using the categorical breakdowns of content, method and organization, instructor, and personal significance. The third series of analyses compared the responses of participants in the four groups to each of four specific questions found in the method and organization portion of the attitude assessment.

The achievement score was derived through two statistical tests. First, to ascertain if differences existed in the pre-test scores, and if no significant differences were found, a second analysis was computed on the gain scores of the groups. All individuals took both tests and the scores are reflected in the gain score computation in the analysis.

Hypothesis 1

There is no difference in participant attitude among the four training methods.

A one-way analysis of variance test was applied to the data. The choice of the one-way was based on the ability to meet the assumptions for the analysis of variance in having interval data with scores which were measures on random samples from a representative population. The one-way performs a one-way analysis of variance for an interval-level variable by one independent variable. The independent variable was the treatment method, composed of the four groups. The dependent variable was the attitude and gain

scores. The population from which the samples were drawn were normally distributed and had approximately the same variance. The aim of the analysis was to determine whether there was a significant difference between the group means. The analysis of variance compared the variability between groups with the variability within groups.

Following the finding of significance using a one-way analysis of variance test, the Tukey method was applied to the data. This statistic provided for the evaluation of differences among pairs of means of unequal numbers. Each mean is compared with every other mean for a test of significance at the 0.05 level.

Attitude Analysis

The first one-way analysis of variance test examined the overall attitude assessment by groups. The level of significance was found to be at the .004 level, exceeding the necessary 0.05 criteria. Reported in Table 4 are the results of the attitude analysis.

A Tukey was used to ascertain where the groups differed significantly. The groups which differed significantly at the 0.05 level were the all face-to-face (group 2) with the all teleconference (group 4) and teleconference followed by face-to-face (group 1). The results of the Tukey are illustrated in Table 5. The asterisk denotes pairs of groups which were significantly different at the 0.05 level.

Table 4

One-way Analysis of Variance: Overall Attitude

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	5.0966	1.6989	4.7869	.004
Within groups	83	29.4566	.3549		
Total	86	34.5533			

Table 5

Tukey: Significantly Different Groups: Overall Attitude

	Group	4	1	3	2
Mean					
3.6469	4 All Tele				
3.6750	1 Tele f-f				
3.8230	3 F-f Tele				
4.2685	2 All f-f	*	*		

p<.05

The Tukey test displayed in tables in this chapter uses the following key: Group 1 represents teleconference followed by face-to-face, Group 2 represents all face-to-face, Group 3 represents face-to-face followed by teleconference, Group 4 represents all teleconference.

Because there was a significant difference in overall attitude between the groups, a second series of analyses was applied to ascertain where the differences were in relation to the attitude assessment. The analyses were applied to the four sections of the attitude assessment: content, method and organization, instructor and personal significance.

Content Analysis

A one-way analysis of variance was used to ascertain if there were differences in the responses between the groups to the questions regarding the content of the course. The results of the one-way analysis of variance are reported in Table 6.

Table 6

One-way Analysis of Variance: Attitude Toward Course

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	3.1219	1.0406	2.6680	.053
Within groups	83	32.3742	.3901		
Total	86	35.4961			

The results of the one-way analysis of variance were found to be significant at the .053 level which did not meet

the criteria for significance at the 0.05 level. No group differed significantly from the others.

Method and Organization Analysis

The second one-way analysis of variance was applied to compare the responses by group to the method and organization portion of the attitude assessment. The results were significant at the .0007 level. The results of the analysis are reported in Table 7.

Table 7

One-way Analysis of Variance: Attitude Toward Method and Organization

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	8.3002	2.7667	6.2577	.0007
Within groups	83	36.6969	.4421		
Total	86	44.9971			

Following the finding of significance in the analysis of variance, a Tukey was applied to ascertain where the groups differed significantly. The groups which differed at the 0.05 level of significance were the all face-to-face (group 2) with the teleconference followed by face-to-face (group 1) and face-to-face followed by teleconference (group 3). The results of the Tukey are displayed in

Table 8. The asterisks denote the pairs of groups which were significantly different at the 0.05 level.

Table 8

Tukey: Significantly Different Groups: Method and Organization

	Group	1	3	4	2
Mean					
3.3606	1 Tele F-f				
3.6877	3 F-f Tele				
3.7241	4 All Tele				
4.2433	2 All F-f	*	*		

p<.05

Instructor Analysis

The third one-way analysis of variance was applied to compare the responses of the groups to the instructor portion of the attitude assessment. The results were found to be significant at the .0036 level. The analysis of variance is reported in Table 9.

Following the finding of significance in the analysis of variance, a Tukey was applied to ascertain which groups were different at the 0.05 level. The results of the Tukey are reported in Table 10. The asterisk denotes the two groups which were significantly different at the 0.0500 level.

Table 9

One-way Analysis of Variance: Attitude Toward Instructor

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	6.2415	2.0805	4.8753	.0036
Within groups	83	35.4201	.4267		
Total	86	41.6616			

Table 10

Tukey: Significantly Different Groups: Instructor

Mean	Group		4	1	3	2
3.8471	4	All Tele				
4.2686	1	Tele F-f				
4.3478	3	F-f Tele				
4.6000	2	All F-f	*			

$p<.05$

The three mean scores which were the highest represent those groups which had the opportunity to see the instructor face-to-face. The all teleconference group (group 4) saw nothing of the instructor during any of the training except in a picture. The Tukey revealed the groups which were significantly different at the 0.05 level to be group 2

(all face-to-face) and group 4 (all teleconference).

Personal Significance Analysis

A final one-way analysis of variance test was applied to the attitude assessment questions pertaining to personal significance. A significance level of .0295 was found. The results of the analysis are reported in Table 11.

Table 11

One-way Analysis of Variance: Attitude Toward Personal Significance

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	9.1587	3.0529	3.1443	.0295
Within groups	83	80.5884	.9709		
Total	86	89.7471			

A Tukey was applied after the finding of significance in the analysis of variance. The test revealed the two groups which were significantly different at the 0.05 level were the all face-to-face (group 2) and the all teleconference (group 4). The results of the Tukey are reported in Table 12. The asterisk denotes the two groups which were significantly different at the 0.05 level.

Table 12

Tukey: Significantly Different Groups: Personal Significance

Mean	Group		4	3	1	2
2.8939	4	All Tele	¦			
3.0000	3	F-f Tele	¦			
3.1061	1	Tele F-f	¦			
3.7500	2	All F-f	---------*			

p<.05

The group indicating the least positive attitude toward the questions dealing with personal significance was the group which had the training via teleconference only and had no face-to-face contact with the instructor.

Finding a level of significance of .0007 in the method and organization segment of the attitude assessment, further analysis was employed to ascertain whether there was a significant difference between the groups in rating four key items found in the method and organization section of the attitude assessment. Those questions were: "I liked the way the course was presented," "I liked the introductory activities," "I liked the skill building activities," "I liked the closing activities." These questions were chosen as critical as each group was exposed to these in a different manner. The introductory activities, the skill building activities and the closing activities varied in

that some were face-to-face and some were via teleconference. A one-way analysis of variance test was applied to all these questions.

Course Presentation Analysis

Significance was found for the question "I liked the way the course was presented." The results of the analysis of variance are reported in Table 13.

Table 13

One-way Analysis of Variance: I Liked the Way the Course was Presented

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	34.1107	11.3702	8.9375	.0000
Within groups	82	104.3195	1.2722		
Total	85	138.4302			

Finding significance in the analysis of variance, a Tukey was applied to determine which groups differed at the 0.05 level. Displayed in Table 14 are the results of the Tukey. The asterisk denotes the pairs of groups which were significantly different at the 0.05 level.

Table 14

Tukey: Significantly Different Groups: I Liked the Way the Course was Presented

Mean	Group		1	4	3	2
2.5238	1	Tele F-f				
2.8182	4	All Tele				
2.8696	3	F-f Tele				
4.2000	2	All F-f	*	*	*	

$p<.05$

The all face-to-face group had a higher mean than did the other three groups. The groups which were significantly different at the 0.05 level were group 2 (all face-to-face) with groups 1, 3, and 4.

Introductory Activity Analysis

Analysis of the question "I liked the introductory activities" showed no significance between the groups. The analysis of variance is presented in Table 15.

Due to the finding of lack of significance between the groups, no further analysis was performed. Illustrated in Table 16 are the means of the groups.

The most favorable group toward the introductory activities was the group 2 (all face-to-face) although there was no finding of significance.

Table 15

One-way Analysis of Variance: I Liked the Introductory Activities

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	6.6420	2.2140	1.3924	.2409
Within groups	83	131.9787	1.5901		
Total	86	138.6207			

Table 16

Summary of Group Means: I Liked the Introductory Activities

Group	Method	Mean
1	Teleconference/Face-to-face	3.3636
2	All face-to-face	3.7000
3	Face-to-face/Teleconference	3.3043
4	All Teleconference	2.9091

Skill Building Activity Analysis

A significance level of .0519 was found in the one-way analysis for the question of "I liked the skill building activities." The analysis of variance results are presented in Table 17.

The analysis of variance revealed no significant difference between the groups. Illustrated in Table 18 are

the mean scores of the groups in response to the question "I liked the skill building activities."

Table 17

One-way Analysis of Variance: I Liked the Skill Building Activities

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	8.0949	2.6983	2.6846	.0519
Within groups	83	83.4223	1.0051		
Total	86	91.5172			

Table 18

Summary of Group Means: I Liked the Skill Building Activities

Group	Method	Mean
1	Teleconference/Face-to-face	3.5000
2	All Face-to-face	3.9500
3	Face-to-face/Teleconference	3.1304
4	All Teleconference	3.2727

Closing Activities Analysis

The final one-way comparing the responses to the question "I liked the closing activities" showed no significance among the groups reporting a level of .0932. The analysis

of variance results are represented in Table 19.

Table 19

One-way Analysis of Variance: I Liked the Closing Activities

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	6.7794	2.2598	2.2101	.0932
Within groups	81	82.8206	1.0225		
Total	84	89.6000			

No significant difference was found between the groups in the analysis of variance. The mean scores of the groups are reported in Table 20.

Table 20

Summary of Group Means: I Liked the Closing Activities

Group	Method	Mean
1	Teleconference/Face-to-face	3.9524
2	All face-to-face	4.1579
3	Face-to-face/Teleconference	3.3913
4	All Teleconference	3.7727

Summary of Attitude Differences

The analysis of the data revealed that there was a significant difference in overall participant attitude among the four training methods, therefore the null hypothesis was rejected. The group which displayed the most significant difference was the all face-to-face (group 2) with the teleconference followed by face-to-face (group 1) and the all teleconference (group 4).

The findings of significance were in the responses to the overall attitude, the method and organization, instructor, and the personal significance segments of the attitude assessment. The responses to the question "I liked the way the course was presented" was also found to be significantly different between the groups.

The section of the attitude assessment which was found not to be significant at the .05 level was the response to the content of the course. The responses to the specific questions in the method and organization section of the assessment which were found not to be significant were the questions of "I liked the introductory activities," "I liked the skill building activities," "I liked the closing activities."

Summarized in Table 21 are the attitude responses of the four groups. Outlined in the table are the responses which were found to be significantly different between the groups and those responses which were not found to be

significant.

Table 21

Summary of Significant Differences in Attitude Responses

Significant Differences	
Overall Attitude	.004
Method and Organization	.0007
Instructor	.0036
Personal Significance	.0295
Course Presented	.0000
No Significant Differences	
Content	.0530
Introductory Activities	.2509
Skill Building	.0519
Closing Activities	.0932

Significance was found in the overall attitude and three of the four sections of the attitude assessment; method and organization, instructor, and personal significance. Analysis of the question "I liked the way the course was presented" found that the groups were significantly different at the 0.05 level. Those items which were not significant at the 0.05 level were the content portion of the assessment and the questions pertaining to the introductory, skill building, and closing activities.

Hypothesis 2

There is no difference in participant learning among the four training methods.

Gain Score Analysis

A one-way analysis of variance test was applied to the pre-test scores by group to ascertain if the groups were significantly different before the treatment. The results of the analysis are reported in the following, Table 22.

Table 22

One-way Analysis of Variance: Pre-test Scores

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	21.6785	7.2262	2.5120	.0642
Within groups	83	238.7583	2.8766		
Total	86	260.4368			

The results of the analysis showed no significant difference in the pre-test scores of the groups prior to the treatment. Since a finding of no significance was determined, it was assumed that the groups were the same prior to the instruction. A one-way analysis of variance was applied to assess the significance of gain scores of the groups after the instruction. The gain scores were determined by computing the difference between pre- and post-test

scores. The results of the analysis are reported in Table 23.

Table 23

One-way Analysis of Variance: Gain Scores

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between groups	3	27.2782	9.0927	2.7044	.0506
Within groups	83	279.0666	3.3622		
Total	86	306.3448			

The analysis of variance test revealed no significant difference in gain scores of the groups. Although there was a significant difference between the attitude of participants in the four groups, there was no difference in learning between the groups. The null hypothesis is retained. Illustrated in Table 24 are the mean gain scores of the four groups.

Displayed in Table 25 are the means of the pre- and post-test scores and the mean gain score computation for each of the four groups.

Table 24

Summary of Gain Scores by Treatment Group

Group	Method	N	Mean Gain Score
1	Teleconference/face-to-face	22	2.77
2	All face-to-face	20	2.95
3	Face-to-face/teleconference	23	2.74
4	All teleconference	22	4.09

Table 25

Summary of Group Means on Pre-test and Post-test and Gain Scores by Ascending Order by Gain Score

Group	Pre-test	Post-test	Gain Score
Face-to-Face	8.95	11.90	1.95
Face-to-Face/Teleconference	10.35	13.09	2.74
Teleconference/Face-to-Face	9.91	12.68	2.77
Teleconference	9.68	13.77	4.09

The face-to-face group had the most to gain after the pre-test score but had the lowest gain score. The group which had the highest gain score, the all teleconference group, had the second lowest pre-test score. The face-to-face followed by teleconference group had the highest pre-test and highest post-test scores but the second lowest gain score.

Hypothesis 3

There is no relationship between attitude and learning.

Attitude and Learning Analysis

The Pearson Product Moment Correlation test was applied to the data to determine the strength and amount of the relationship between the two variables of attitude and learning.

A Pearson Product Moment Correlation test was applied to test for the relationship between the overall attitude and learning as determined by the gain scores of the participants in the entire group. The level of significance was found to be .427; above the required .05 level. The correlation was reported at .02.

A second series of tests was applied to ascertain if there was a relationship between attitude and learning based upon gain scores dependent upon group membership. The results are displayed in Table 26.

There was no relationship between the attitude and learning by the overall group or by the groups when separated and analyzed. The null hypothesis is retained.

Compared in Tables 27 and 28 are the overall attitude score by group with the mean gain score by group.

Table 26

Correlation of Attitude and Gain Scores

Group	Method	Significance	R
1	Teleconference/Face-to-Face	.307	.1137
2	Face-to-face	.163	-.2311
3	Face-to-face/Teleconference	.262	.1398
4	Teleconference	.216	.1768

Table 27

Overall Attitude Score with Gain Score in Ascending Order by Attitude Mean

Group	Method	Attitude Mean	Gain Score Mean
4	Teleconference	3.65	4.09
1	Teleconference/Face-to-face	3.68	2.77
3	Face-to-face/Teleconference	3.82	2.74
2	Face-to-face	4.27	2.95

Table 28

Overall Attitude Score with Gain Score in Ascending Order by Gain Score

Group	Method	Attitude Mean	Gain Score Mean
3	Face-to-face/Teleconference	3.82	2.74
1	Teleconference/Face-to-face	3.68	2.77
2	Face-to-face	4.27	2.95
4	Teleconference	3.65	4.09

There was a significant difference between the groups in the responses to the attitude assessment. The overall response to the attitude assessment was analyzed with a result of a significance of .0040. There was no significant difference in the gain scores between the groups. The significance level for gain scores was .0506.

Summary

The purpose of the analysis of the data was to determine whether differences in attitudes and learning existed between four different groups exposed to four different instruction methods. Following the analysis, a correlation was performed to determine whether a relationship existed between attitude and learning.

The first analysis was performed to determine if there was a difference in overall attitude between the groups. There was a significant difference in attitude between the groups as reflected in responses to the attitude assessment.

Due to a finding of significance, a further analysis was performed to ascertain if there was a difference between the four groups in the responses to the four segments of the attitude assessment. Those segments were labeled content, method and organization, instructor, and personal significance. There was no significant difference between the groups in regard to the content responses. There was a significant difference in responses to the method and

organization, instructor, and personal significance section of the assessment.

A further analysis was performed on four specific questions which addressed key differences in the method of presentation and content delivery. Three of the four questions were not found to be significant at the 0.05 level. Those questions were "I liked the introductory activities," "I liked the skill building activities," and "I liked the closing activities." The responses to the question "I liked the way the course was presented" were significantly different.

The groups which were significantly different regarding the overall attitude assessment responses were the all face-to-face group with the all teleconference group and the teleconference followed by face-to-face. The groups which were significantly different regarding the responses to the method and organization portion of the attitude assessment were the all face-to-face group, the face-to-face followed by teleconference group and the teleconference followed by face-to-face group.

The groups which were significantly different regarding the responses to the instructor and personal significance portions of the assessment were the all face-to-face group with the all teleconference group. Significantly different in the responses to the question "I liked the way the course was presented" was the all face-to-face group with the other

three groups; teleconference followed by face-to-face, all teleconference, and face-to-face followed by teleconference.

The null hypothesis stated as "There is no difference in participant attitude among the four training methods" was rejected following a finding of significant difference between the groups.

The results of the data analysis regarding the learning were not found to be significant between the groups. A one-way analysis of variance was performed to ascertain if there were differences in the pre-test scores of the four groups before the instruction. Finding a significance level of .0642, it was determined that the groups were not significantly different before the treatment was administered. A second one-way analysis of variance was performed on the gain scores for each of the groups. The gain scores were determined by computing the differences between pre- and post-test scores. The level of significance was .0506 which was determined to not meet the 0.05 criteria of a significance difference. The null hypothesis stated as "There is no difference in participant learning among the four training methods" was retained due to a finding of no significance.

The test of the third hypothesis "There is no relationship between attitude and learning" was computed by a Pearson Product Moment Correlation. The results of the analysis showed no relationship between the attitude

responses and the gain scores of the members of the four groups. Therefore, the hypothesis was retained.

The finding of no significant difference between the groups in learning is consistent with the review of the literature. Significant differences in the attitudes of participants regarding the method of instruction was not a consistent finding in the reported research. The absence of a relationship between the attitude of participants and achievement is consistent with the findings in the review of literature. The following chapter summarizes these findings and recommendations regarding the use of electronic media for instructional purposes are proposed.

CHAPTER FIVE

Discussion, Conclusions, and Recommendations

Problem

Audio teleconferencing is a communication technology which enables persons in varying locations to interact with one another via telephone lines. The major difference between a teleconference and a routine telephone call is the ability to include far more participants than in a conference telephone call. However, as in a telephone call, the participants may interact with one another but may not see each other.

Providing education and training via audio teleconferencing poses questions regarding achievement when the students cannot see the instructor. Is there a difference in the attitudes of students who see the instructor and those who do not have visual contact? Are students able to learn when they cannot see the instructor? Does the attitude of the students toward the lack of face-to-face contact affect achievement?

The purpose of this study was to examine the differences in attitude and achievement of students who participate in training via teleconferencing, in face-to-face training, or a combination of both teleconferencing and face-to-face.

If differences exist, does attitude toward the method of delivery affect learning? The following null hypotheses were tested:

1. There is no difference in participant attitude among the four training methods.
2. There is no difference in participant learning among the four training methods.
3. There is no relationship between attitude and learning.

Discussed in this chapter are findings resulting from the data analysis for the three hypotheses. A reiteration of the analysis is provided followed by an explanation of the results.

Discussion and Conclusions

This study found that there was a significant difference in attitude between the groups receiving training. Statistical tests for Null Hypothesis 1 indicate that it must be rejected. The group which had the training all face-to-face was more positive in their responses to the attitude assessment than were the other three groups. Significant differences were found in four specific areas: overall attitude toward the training, attitude toward the method and organization of the course, attitude toward the instructor and responses to the question "I liked the way the course was presented." Significant differences were found using a one-way analysis of variance. Upon a finding of significance, a Tukey was used to determine between which

groups were the differences.

No significant differences were found in group attitude toward the course content, personal significance gained, and responses to the questions "I liked the introductory activities," "I liked the skill building activities," and "I liked the closing activities."

The differences between the groups were varied. The method and organization responses were significantly different between the all face-to-face group and two other groups: the teleconference followed by face-to-face and the face-to-face followed by teleconference. The instructor and personal significance responses were significantly different between the all face-to-face group and the all teleconference group.

The face-to-face group differed significantly from all three groups in responses to the question "I liked the way the course was presented."

The mean scores of the groups demonstrated that as face-to-face increased, attitude responses improved. The all teleconference group had the lowest mean score on the attitude assessment, 3.65. Second lowest was the teleconference followed by face-to-face group, 3.68. When face-to-face preceded teleconference training, the attitude assessment responses continued to increase in mean score, 3.82. Finally, when the instruction was face-to-face only, the highest mean score was obtained, 4.27.

In the overall attitude assessment, the Tukey did not show significant differences between the all face-to-face and the face-to-face followed by teleconference group. This finding indicates that no significant difference exists between groups which have material presented all face-to-face and those which have face-to-face prior to a teleconference training, albeit for only a short period, compensated for the lack of face-to-face interaction when training was conducted via teleconference.

Causes for the findings of significant differences between the groups may be attributed to several factors. The all teleconference group was more favorable toward the training as indicated in responses to the method and organization section of the attitude assessment although they were the only group never to see the instructor face-to-face. This may have been caused by participants concentrating more on the content since it was delivered auditorily. Additionally, this group had to travel to the teleconference site only and not make an extra trip to convene as a whole group. Consequently, their preferences regarding limited travel may have influenced the responses.

Further Tukey analysis on the method and organization portion of the assessment revealed a significant difference between the all face-to-face and the two groups which had face-to-face in conjunction with teleconferencing but not teleconference only. This may have been caused by

participants being required to convene twice, once for the teleconference session and once for the face-to-face interaction. The travel and time requirement may have affected the responses.

The Tukey analysis of the instruction and personal significance portions of the assessment revealed significant differences between the face-to-face and the all teleconference groups. This may have been due to the format extremes in which the course was presented. The all face-to-face group had the instructor present throughout the instruction and had the most positive score, 4.60. The all teleconference group had the most negative score, 3.85, and did not see the instructor. In this case, it appears that having the instructor face-to-face made a difference in the attitude scores of the groups.

Causes for the lower mean scores for instruction involving teleconference may have been due to a preconceived negative opinion of participants toward teleconferencing. Prior to the installation of the teleconference equipment, instruction was delivered face-to-face. Teleconference training decreased the opportunity for employees to meet together. Loss of face-to-face training limited the need to travel which could be viewed as an escape from the office routine.

Paul Gillette, writing in Association Management, states, "The trick is first to explain teleconferencing--what

it is and how it works--before you try to sell your members on the contents of the program."[1] The Department of Human Services did not explain the uses and advantages nor the differences in travel requirements which would be existing due to the installation of teleconferencing.

Further, the loss of personal interactions with peers may have caused employees to feel isolated with no opportunity to share job related and personal issues. Williams reports,

> The medium of communication seems to effect the structure of groups. For instance, leaders do not emerge in small group teleconferences in the same way as they do in face-to-face groups. Small groups are also likely to break up into opposing coalitions on the lines of the physical separation produced by the teleconference system.[2]

Teleconference training causes participants to gather together in small groups at the teleconference locations with only a microphone and speaker box representing the instructor. Additionally, technical difficulties have historically caused training content to be disjointed or at times missing. Although technical difficulties were at a minimum in this study, these occurrences further foster the feeling of isolation and do little to overcome the previous

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[1]Gillette, p. 95.

[2]Ederyn Williams, "Teleconferencing/Social and Psychological Factors," Journal of Communication, 28 (1978), 127.

negative reactions to equipment malfunction.

It was indicated on the open-ended questions of the attitude assessment that the need to travel to the face-to-face location for the scheduled one hour meeting was unnecessary and viewed as a waste of time. Because this training was mandatory, choices regarding attendance were not an option. Mandatory teleconference training may have been viewed more negatively than if the instruction had been delivered face-to-face.

The data shows that those attending preferred to have the instructor in person. This presence creates a sense of the entire group with the opportunity to observe eye contact and non-verbal behavior of others in the group. Generally, in face-to-face instruction, the instructor is able to alter the content based on non-verbal cues while at the same time enhancing group cohesion and belongingness. In teleconference instruction this is not possible.

The attitude toward the instructor was rated positively by all four groups. The all face-to-face group with a mean score of 4.60 was more positive than the all teleconference group. The mean scores for the instructor evaluation on the attitude assessment favorably increased as face-to-face increased; from all teleconference, 3.85, to teleconference followed by face-to-face, 4.27, to face-to-face followed by teleconference, 4.35, to all face-to-face, 4.60.

As stated in the delimitations, responses to the assessment were limited by the assessment instrument itself. Some of the questions may have been misinterpreted, i.e., "I liked the way the course was presented," "I liked the introductory activities," "I liked the skill building activities," "I liked the closing activities."

Although these questions were designed to identify the differences in course method and delivery which were varied in all the groups, responses to the questions may have been misinterpreted as not relating to teleconference or face-to-face instruction. The questions regarding introductory, skill building and closing activities may not have been perceived as related to segments of the course although the instructor referred to those segments as the instruction progressed.

Responses to the question relating to the helpfulness of the facilitator were positive; 87 percent or seventy-six responses were marked five on the five-point scale. Five, or 5.7 percent responded to the facilitator question indicating a one. No other choices were available on the instrument. This highly positive response may have been caused by the facilitator being perceived as an extension of the instructor. The facilitators had been trained in the content, were required to process questions for the trainer, wrote participant responses on easel paper, and had the overall responsibility for the participants while at

the training.

Other possible causes for the differences in reactions to the various methods of training were the all teleconference group experienced two technical breakdowns of five minutes each which caused a break in the instruction and may have affected the attitude assessment responses.

The content may have been viewed as non-threatening and was presented as a means to promote personal development. However, responses to both the content and the instructor may have caused the reactions to the method of delivery.

Null Hypothesis 2 was accepted. There was no difference in learning between the groups. The method of delivery of instruction made no difference in achievement when computing differences in pre- and post-test scores. Regardless of visual sight of the instructor, achievement between the groups was not significantly different.

The all face-to-face group had the lowest pre-test score, 8.95, and had the most to gain in the post-test score; yet received the second highest gain score, 2.95. The group with the highest gain score, 4.09 although not of a significant difference, was the all teleconference group. The pre-test score of the all teleconference group, 9.69, was the second lowest as compared to the other groups. The face-to-face followed by teleconference group had the highest pre-test score, 10.35, and the lowest gain score, 2.74.

The all face-to-face group had the most positive attitude score, 4.27, and second highest gain score, 2.95. The highest gain score, 4.09, was that of the all teleconference group which had the most negative attitude score, 3.65. There was more achievement in the all teleconference group than in the other groups.

This increase in achievement may have occurred due to the fact that the all teleconference group was the last group to receive the training. The opportunity for the instructor to improve the instruction may have been a factor in the amount of learning. The group which had the second highest gain score, 2.95, was the all face-to-face group and had the most favorable attitude score, 4.27. This group had the instruction second in the series.

No significant differences in learning between the groups may have been due to the course content. It was written to be generic in nature and participants indicated on the attitude assessment that the content was not new to them. This could possibly account for the attitude of participants toward the method of training. The training medium did not affect learning.

The all teleconference group had the highest gain score of the four groups. This may have been caused by the lack of distraction due to not being able to see the trainer so participants could concentrate more on the content presented. Face-to-face instruction created more

emphasis on the non-verbal and group behavior aspect of instruction and less on the content and learning. Nevertheless, it was the teleconference group which achieved the most gain in post-test scores although their attitude toward the method of delivery was negative.

Hypothesis 3 was accepted. There was no relationship between attitude and learning among the groups. Statistical tests indicated that there was no correlation between the attitude and gain scores of the groups. The overall correlation was found to be .02 and the level of significance was reported to be .427.

Recommendations

> The job of the instructor is to effect learning.
>
> The educator's real responsibility is to induce, improve and encourage learning . . . An educator's primary focus would be on changing or re-orienting attitudes so that they will exert a favorable rather than a detrimental influence on learning.[1]

Recommendations for improvement in teleconference instruction are many. They fall into the areas of humanization, participation, presentation style, and feedback.

Educators must create an environment which emphasizes the importance of the individual in an effort to overcome the effects of distance as a barrier to communication.

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[1]James Lewis, Jr., Administering the Individualized Instruction Program (New York: Parker, 1971), p. 109.

This humanizing will lead to a sense of group rapport. Personal visits by the instructor, pictures, slides, a resume of the instructor, or other video equipment tends to bridge the distance between instructor and remote participants. This study provided a picture, resume of the instructor and a facilitator present for the instruction.

Providing for participation in the communication and learning process involves development of instruction requiring interaction to take place. Those new to the mechanics of teleconferencing fear talking into the microphone. The instructor would do well to provide initial time for participants to familiarize themselves with the equipment by encouraging them to talk as soon as possible. This study provided for participation through the initial warm-up activities which were designed as an ice-breaker to create conversation. Provisions for group discussion were designed into the instruction.

The presentation style should be one in which the content is received, understood and remembered.

> One important factor in designing purely aural messages is the difference between the rate at which we speak and the rate at which we think. The average rate of speech for most people is about 125 words per minute, while the brain processes data at much higher rates . . . The ensuing gap often causes listeners' minds to wander.[1]

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[1]Mavis Monson, "Teleconferencing/Designing for the Participants," Journal of Communications, 28 (1978), 135.

Instruction design using teleconferencing should realistically acknowledge that much of their audience will be distracted at any given moment. Repetition and summaries were incorporated frequently in this study to help provide cues for those listeners whose thoughts have momentarily strayed.

Feedback is necessary to enable both the instructor and participant to correct errors and omissions to improve the accuracy of the communication. In face-to-face interactions, the nonverbal cues of participants assists the instructor in assessing whether the material is being understood. Teleconferencing requires the instructor to provide for frequent opportunities for feedback from participants. Instruction design needs to be written to allow for questions and discussion among participants and instructor.

Further recommendations include use of facilitators at the teleconference sites. Facilitators may be trained in the content if they are to handle questions and problems should they surface in the training. The facilitator can be perceived as an extension of the instructor and serve as an effective method to overcome the absence of face-to-face interaction. They are able to provide additional information when required, assist if technical difficulties arise, and observe the nonverbal cues indicating comprehension by participants when the instructor is not visible.

It is advisable to have a variety of techniques of instruction in the design. These include handouts which are of various colors for easy identification, small and large group activities, which promote participation, and audio-visual materials and equipment to stimulate learning through more than just the auditory senses. Lectures should be kept at a maximum of twenty minutes to assure the attention of the participants.

The training is more positively received if it is not mandatory. Additionally, if face-to-face is a possibility to be included with teleconferencing, arrangements should be made for the instructor and participants to meet face-to-face prior to the teleconference session.

Future research in the area of teleconference training as it affects attitude and learning should be conducted. Suggestions regarding future research concern the use of the instrument which was devised to measure attitude, the sample size, length of the training, and the demographic make-up of the participants in the study.

The attitude assessment should be conducted both before and after the treatment. This will more accurately measure the attitude of participants toward the method of instruction to assess if a change has taken place. It is recommended that a larger sample be taken to assure accuracy of results. Although this sample is larger than many of the samples cited in the research, larger samples

may lead to some substantial conclusions. If face-to-face interaction is utilized with teleconferencing, the length of the face-to-face session should be longer than one hour. The length of a teleconference session lasting three hours is appropriate.

Future research should address several factors: the length of employment, classification or job responsibility, work location, sex, age, and educational background of the participants attending as variables which may possibly effect achievement and attitude. As stated in the limitations, this study did not address these components.

The results of this study have confirmed the research previously conducted in the area of electronic media as an instructional method. Audio teleconferencing can be utilized as an effective method for instruction and the learning which takes place is equal to and, in some cases, greater than in the conventional classroom.

The research provided in this study has examined the use of teleconferencing in a manner which has not, to this date, been duplicated; that is, comparing teleconferencing in combination with face-to-face instruction. The findings are unique in that they indicate to the instructional designer that when considering teleconferencing and face-to-face in tandem, it is preferable to arrange for the face-to-face contact prior to the teleconference experience.

Of importance to the curriculum designer is the fact

that achievement will occur using teleconference instruction without accommodating for face-to-face interaction. The results of this study indicate that although attitudes are more positive toward the instruction when the presenter is face-to-face, learning will occur. In the world where effective use of time and resources makes an impact on educational programming, teleconferencing can provide an alternative method of instruction while insuring quality education.

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APPENDIX

COMMUNICATING A POSITIVE SELF-IMAGE

IN THE SPACE PROVIDED, ENTER THE MOST APPROPRIATE RESPONSE

_____ 1. The most readily identifiable quality of a successful person is an overall attitude of personal _____.
1) optimism and enthusiasm
2) health
3) self importance
4) ability

_____ 2. When the mind and body are in balance they are known to be in a state of _____.
1) homeostasis
2) self-fulfillment
3) stress
4) self-motivation.

_____ 3. _____ are among the greatest motivators.
1) rewards and punishments
2) fear and desire
3) recognition and effectiveness
4) success and failure.

_____ 4. The ability to attract the support and cooperation of other people is known as _____.
1) friendship
2) self concept
3) leadership
4) self motivation

_____ 5. Successful people are aware of the role _____ plays in the creation of up-grading of self-image.
1) stress
2) entertainment
3) imagination
4) emotion

_____ 6. Self image is made up of your feelings, fears and _____ responses to each personal experience up to the present.
1) emotional
2) everyday
3) stress
4) behavior

_____ 7. Self discipline is _____.
1) creating a new way to do things
2) mental practice
3) learning a new skill
4) permanent change

_____ 8. The deep-down feeling of a person's own worth is known as _____.
1) self-esteem
2) self-discipline
3) leadership
4) awareness

_____ 9. The premise that states every individual possess certain basic human rights is known as _____.
1) responding
2) assertion
3) aggression
4) leadership

_____ 10. When one violates the basic human rights of others the exhibited behavior is known as _____.
1) assertion
2) nonassertion
3) aggression
4) leadership

_____ 11. _____ takes place when one person allows his or her rights to be violated.
1) assertion
2) nonassertion
3) aggression
4) passivity

_____ 12. With an aggressive response the tension is turned _____.
1) outward
2) inward
3) into normal behavior
4) inappropriately

_____ 13. The words "maybe", "I guess", or "only" express _____.
1) aggression
2) nonassertion
3) assertion
4) self awareness

_____ 14. Scripting is the process of _____.
1) thinking what you will say
2) thinking aloud
3) writing an assertive response
4) voicing your opinion

_____ 15. The benefit of scripting is _____.
1) providing a chance to rehearse a plan of action
2) letting someone know what you think
3) getting it off your mind
4) verbalizing your feelings

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1 15. The benefit of scripting is _____.
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Complete the evaluation using the following scale.

1-- Never/No
2-- Seldom
3-- Adequate
4-- Most of the time
5-- Always/Yes

Circle the number of the response which most closely agrees with your assessment of this training session. Questions 13-17 require a yes or no response, use 5--Yes, 1--No.

CONTENT

1.	The scope and dept of the material was complete.	1 2 3 4 5
2.	The information provided was useful.	1 2 3 4 5
3.	The organization of the information was logical.	1 2 3 4 5
4.	The handouts and other learning supplements were clear and complete.	1 2 3 4 5
5.	The concepts taught were new to me.	1 2 3 4 5

METHOD AND ORGANIZATION

6.	The classroom as a learning enviroment was comfortable.	1 2 3 4 5
7.	The use of various kinds of audio and video equipment made the training more meaningful.	1 2 3 4 5
8.	The equipment functioned well.	1 2 3 4 5
9.	I liked the way the course was presented.	1 2 3 4 5
10.	I liked the way the introductory activities were presented (introductions, warm-up, pre-test).	1 2 3 4 5
11.	I liked the way the skill building activities were presented.	1 2 3 4 5
12.	I liked the way the closing activities were presented (summary, film, post-test).	1 2 3 4 5
13.	The site representative was helpful.	1 5
14.	The length of the course was appropriate.	1 5

15.	The time of day made learning easier.	1 5
16.	The size of the group at the training site made learning easy.	1 5
17.	The travel requirements did not hinder my learning.	1 5

INSTRUCTOR

18.	The instructor was prepared.	1 2 3 4 5
19.	The instructor was able to stimulate interest.	1 2 3 4 5
20.	The instructor satisfactorily explained concepts.	1 2 3 4 5
21.	The instructor encouraged participation (questions and discussion).	1 2 3 4 5
22.	The instructor satisfactorily answered questions.	1 2 3 4 5
23.	The instructor was sensitive to the responses of the participants.	1 2 3 4 5
24.	The instructor was knowledgeable about the subject matter.	1 2 3 4 5
25.	The instructor provided practical examples of the material.	1 2 3 4 5
26.	The instructor kept the group on track.	1 2 3 4 5
27.	The instructor was enthusiastic about the subject and teaching.	1 2 3 4 5
28.	The instructor's teaching style and presentation made learning enjoyable.	1 2 3 4 5

PERSONAL SIGNIFICANCE

29.	During the course, I had a clear understanding of how I would apply what I learned.	1 2 3 4 5
30.	Participation in the course made me want to learn more about the topic.	1 2 3 4 5
31.	The knowledge I gained will enable me to do my job better.	1 2 3 4 5

1. What did you like most about the course?

2. What did you like least about the course?

3. What recommendations would you make about future courses on this topic?